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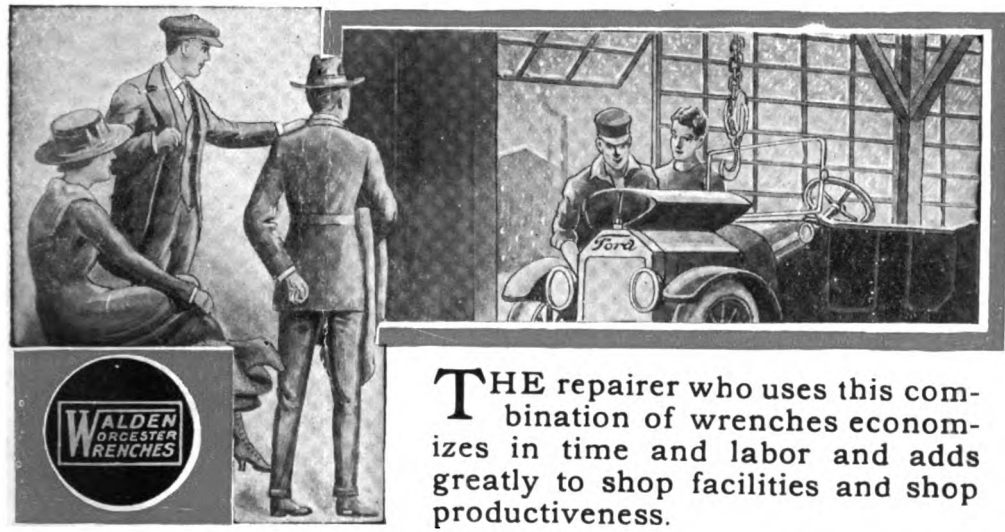
AUTOMOBILE JOURNAL

DEVOTED TO
OWNERS OF NEW AND USED CARS, DEALERS AND REPAIRERS

VOL. LXV. PAWTUCKET, R. I., FEBRUARY 10, 1918. NO. 1.

779223 V. 6 5-11-18

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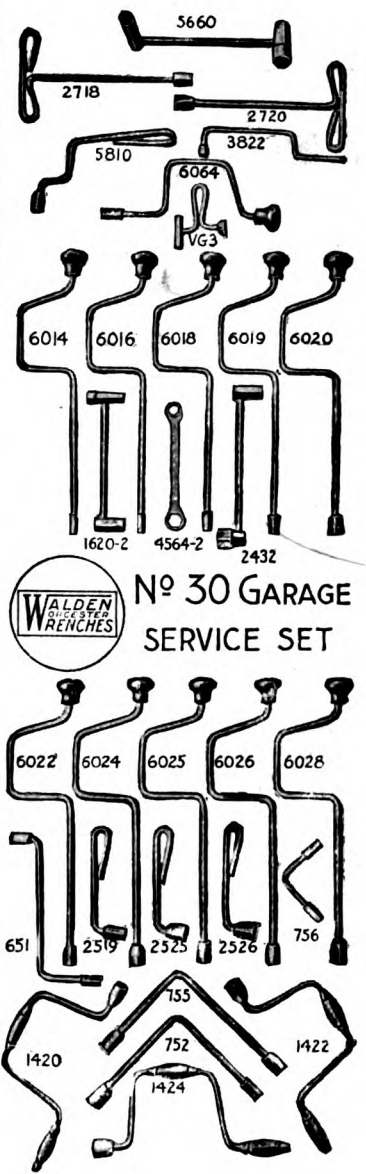
Offset Wrenches	13	Special Wrenches.....	5
Speed Wrenches	10	Demountable Rim Wrenches	3
L-Wrenches.....	6	Tee-Handle Wrenches.....	2
Total.....		39	

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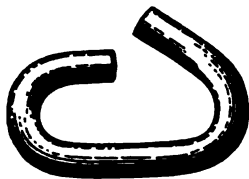
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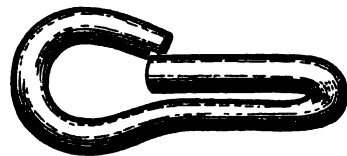
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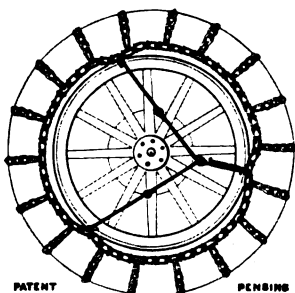
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These national periodicals are printed in the big cities—and the first zone, the cheapest zone, is in or near those cities; there are many educational opportunities near cities, and the cities will read anyway. Small towns and distant districts depend to a large extent upon periodicals; thus this law increasing periodical postage where it is most needed shuts off opportunity where needed. It penalizes periodical readers.

Repeal this law. Repeal this FIFTY TO NINE HUNDRED PER CENT. periodical postage increase. Sign the petition below and mail it. Put a cross mark in the square—save the periodicals and the work that they have done and are doing for national education and patriotism.

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VOL. LXV.

FEB. 10, 1918.

NO. 1.

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Treasurer . . WILLIAM H. BLACK

Secretary D. O. BLACK, JR.

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AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

THE Commercial Economy Board, Council of National Defense, has adopted a retail delivery program which will be urged for adoption among retail merchants in all towns of 2500 population or more. The program provides for a maximum of one delivery a day, elimination of all special deliveries, restrictions on returned goods, C. O. D. privileges and the establishment of cooperative delivery systems in small and medium sized communities. This plan will not only place the delivery systems on a more efficient basis, but will incidentally prove the superiority of the motor car as a means of handling deliveries over the horse drawn type of vehicle, as the cars will carry full loads over properly arranged routes, giving cheaper, quicker and more satisfactory service, as well as extending the service beyond the scope of what could be attained with the old fashioned methods.

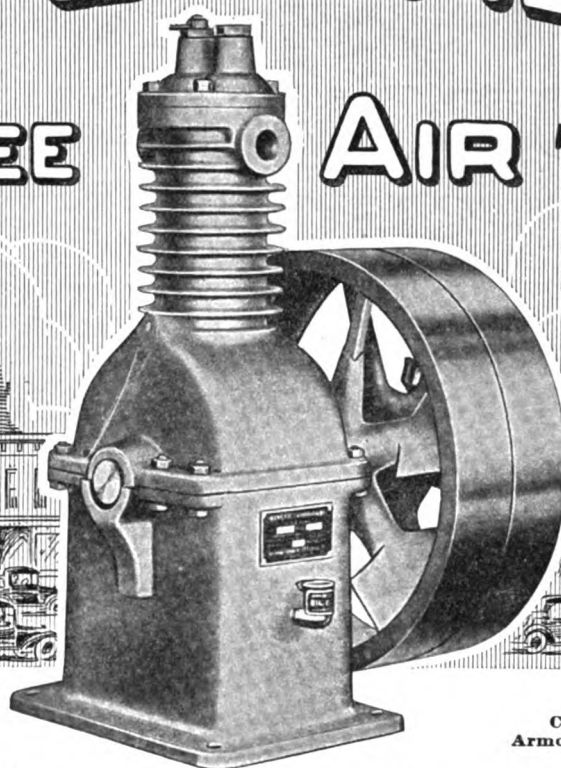
EVERY man who is qualified in any respect to meet the government's call for 250,000 skilled mechanics to help in construction of our merchant fleet, should answer the call at once, as he not only owes such service to the men in the trenches, his country and himself, but to all his fellow workers, as everything that labor turns out for exportation must wait upon the completion of the shipping that is to carry those supplies. All men who are fitted to volunteer for this work should go to the nearest enrollment agent of the United States Public Service Reserve of the Labor Department or the local enrollment agent of his State Council of Defense, and register themselves as willing to work in the shipyards if called. Men working in the ship yards will be placed in the deferred class in the draft.

IT IS not generally known that the Boston Automobile Show, held annually in that city, is the largest exhibition of motor cars and accessories in the world. As a comprehensive exhibition of the products of the motor car industry it has no peer, and, furthermore, is the largest retail market of these products in existence, some \$4,000,000 worth having been disposed of during the seven days it was open last year. While practically as large as the National Shows in New York and Chicago in numbers of passenger car exhibitors and exhibits, it is the largest exhibition of commercial cars held in the world and this year will rank with the other shows as regards accessories, as the show has been sanctioned by the Motor Accessory Manufacturers' Association, which is composed of the best known and largest manufacturers of car parts and accessories in the country. The majority of these members will exhibit at the show. The next issue of the Automobile Journal will publish a very complete and exhaustive advance notice of this year's Boston Show.

IN THE vindication of the automobile as a "public utility," which came from the recent attempt in Washington to class it as a non-essential, the industry has received the greatest boon in its history, as where heretofore public speakers seldom referred to it in its true aspects, but were inclined to ignore it, at present it calls for the attention of high public men as one of the "mediums" by which we are going to win the war. Governor Whitman of New York State in a recent address paid a high tribute to the motor car from this point of view, saying that the war had demonstrated the tremendous importance of this new method of transportation and service rendered by car manufacturers.

DEPENDABLE

FREE AIR WITHOUT OIL



New York Show Exhibit
Spaces D-171-172

Chicago Show Exhibit
Armory Balcony Spaces 23-24

Better Service Brings You More Trade

Auto owners have awakened to the fact that all Free Air Service is not alike. They are demanding PURE AIR for their tires because they have learned that oil rots tires and that AIR FREE FROM OIL means less blowouts, fewer punctures, greater tire mileage, less repairs and a great saving in up-keep every month. Cater to the demands of auto owners—give them what they want. Make your place the most popular in town by furnishing

CURTIS AIR FREE FROM OIL

Curtis Compressors are the result of 25 years experience in the manufacture of high grade pneumatic machinery. They are reliable, dependable, require practically no attention, are economical to operate, guaranteed to stand up under the severest strains of hard usage and furnish a continuous supply of cool, pure, clean air. While others claim to furnish air free from oil, Curtis is the only Garage Air Com-

pressor with the controlled splash oil system—our own exclusive patented device which prevents flooding the cylinder with more oil than it needs or can use—and eliminates all danger of forcing oil into the air line. Curtis Air is pure air—free from impurities—free from oil—the kind of air that makes tires last longer and pleases every patron.

Curtis Compressors Pay For Themselves

They build business—hold your old trade—bring new patrons to your door—and by the superiority of your Free Air Service, create a feeling of confidence in the quality and reliability of your entire stock. And more than that—a Curtis Compressor will save you big money by supplying air for air hoists, painting, cleaning, vulcanizing, blowing dust and drillings from tools and serving you in many other ways.

5 Sizes—125 Combinations

There is a Curtis Compressor to meet the requirements of your business in every way—just the size, arrangement and price to please you. It will pay you to investigate. Ask your jobber—or cut out and mail us the attached coupon TODAY.

Curtis Pneumatic Mach. Co.

1621 Kienlen Ave., St. Louis, Mo.

Branch Office

531-A Hudson Terminal,
New York, City

Curtis
Pneumatic
Machinery Co.
1621 Kienlen Ave.
St. Louis, Mo.

Gentlemen: Please send me full
details on Curtis Air Compressors
—your proposition and low prices.

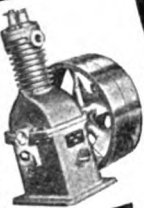
Name

Address

Jobber's Name

Address

Five Sizes
—Tight
Pulley
Only, or
Tight and
Loose
Pulley

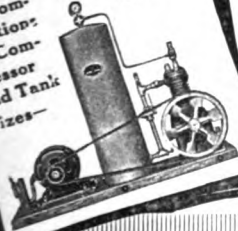


10 Combinations
of Compressor
and Tank Sizes
Any Current



11 Combinations
of Compressor
and Tank
Sizes—

Any
Current



BOSTON AUTOMOBILE SHOW

March 2—9 (Inclusive)

Mechanics Building—Horticultural Hall

10 A. M. 10:30 P. M.

*The Boston Automobile Show This
Year Will Surpass Any Display
Ever Held in America*

With hardly an exception all types and models of passenger cars will be shown.

The display of accessories, parts and fittings will be even more comprehensive than in past years.

The showing of trucks, business wagons, and convertible units will be representative of the whole commercial vehicle industry, and for the first time the producers of parts will conduct exhibitions in connection with the Boston Show.

DECORATIONS will excel all previous efforts, and in number of lines shown the 1918 display will afford visitors the opportunity of viewing all standard and specialized products that will be offered by makers during the year to come.

**SPECIAL ORCHESTRAL AND BAND PROGRAMMES
AFTERNOONS AND EVENINGS**

Admission : : : : 50 cents

Personally directed by CHESTER I. CAMPBELL

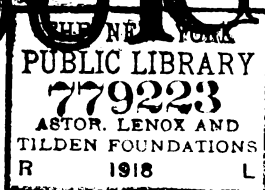
FOR THE

*Boston Automobile Dealers Association, Inc., and
Boston Commercial Motor Vehicle Association, Inc.*

The Automobile Journal

VOL. LXV.

FEBRUARY 10, 1918.



NO. 1.

Further Advance In Car Prices Expected In Spring Owing to Curtailed Output and Lack of Shipping Facilities

Automobile Prices Have Not Kept Pace With the General Advancing Tendency of Commodities Throughout the World—Developments Indicate a Car Shortage Is Inevitable and "Drive-Away" Charges Will Be Made

Automobiles Slow in Following Price Trend

A comparative analysis of price fluctuations of automobiles and leading commodities just made by the National Automobile Chamber of Commerce, has revealed the fact that automobiles have not advanced proportionately and have been slow in following the world-wide price trend, which has been upward since the European war broke out.

The average wholesale price of all the automobiles and motor trucks produced in the United States during the last six years shows a decrease each year ranging from 4.7 per cent. to 16.5 per cent. until last year, when there was an increase of four per cent.

In that year they increased 18 per cent.; in 1916 more than 28 per cent., and last year more than 30 per cent.

Bradstreet's Commodity Index			London Economist Commodity Index			
Motor vehicles	Per cent.		Motor vehicles	Per cent.		
Average whole-	increase		Average whole-	increase		
sale prices.	or decrease.		sale prices.	or decrease.		
1912.....	\$1,000	.....	9.54	.....	2,721	.....
1913.....	877	—123	9.23	—032	2,661	—022
1914.....	806	—081	9.03	—022	2,760	+032
1915.....	770	—047	10.65	+180	3,500	+271
1916.....	640	—165	13.66	+282	4,779	+365
1917.....	666	+040	17.81	+305	5,768	+205

TOWARD the latter part of the year just closed there was a feeling of timidity in the automobile trade regarding the outlook for the new season owing to the fact that the trade had never passed through a season while the country was involved in war and dealers were inclined to take their cue in judging the situation from what had happened in England, where prices of used cars rose to levels above original selling prices, owing to the fact that the production of cars was greatly curtailed. This pessimism is nowhere evident now that the big National Shows have been held, as they indicated a practically normal demand for cars. Prices have advanced on most every make of car, but this advance is not in proportion to the rise that has taken place in many commodities, as shown in the accompanying table. These higher prices will not ma-

terially affect the sale of cars, but will have the effect of increasing the value of used cars, which will work for better conditions throughout the trade.

Less than six months ago manufacturers and distributors saw the "handwriting on the wall" and predicted without restraint that the Spring would witness a severe shortage in new cars. These forecasts were taken by the public in general with some skepticism, as it was believed after the first flurry occasioned by the war that everything in the manufacturing line would continue along as usual, but now with Spring less than two months away, the public is facing an absolute shortage in cars, which will be accentuated by the fact that it will be possible to secure only a few cars from the factories by freight. When this is possible under the present congested conditions on the railroads it takes from a

month to six weeks to get a freight car from Detroit to the eastern seaboard, so there will probably be a large percentage of the cars driven over the roads to market.

Many well known men in the industry have gone on record as predicting that a large number of motorists who buy a new car each year will be obliged to continue with their last year's model. All developments at present indicate that these predictions will come true and will probably materialize in a more extensive form than anticipated. The reduction of the production schedule of the Ford Motor company, reported to be 40 per cent., means a cut in manufacture of at least 300,000 cars, while reductions on a smaller scale by other companies will swell this number to a total of at least 450,000 cars, or about 25 per cent. of the estimated production schedule for the year throughout the industry.

Aside from this fact of a smaller car output the unprecedented freight conditions will probably exercise a very powerful influence toward higher prices in the spring by delaying deliveries and making it difficult to secure uniform and regular shipments from the car manufacturing centres. This element in the situation has already made itself felt in the trade and been the cause of no little worry, as buyers who want their cars immediately are obliged to pay from \$75 to \$100 to defray the charges of driving the machines over the roads from the factories to points 500 miles away or more. Many dealers have been obliged to incorporate this item in their contracts as they look forward to the time in the coming spring when no orders can be taken with certainty of delivery

at a fixed date, unless the buyer is willing to pay the additional costs accruing from bringing the car from the factory over the road. Freight cars, suitable for shipping automobiles, are practically unobtainable now and the dealers feel that when the demand increases a month hence they will face the worst situation ever experienced in the trade, from a standpoint of shipping.

There is less anxiety, however, in the trade on account of these developments, as the automobile, in passing through the fire of criticism incident to the hearings on the three per cent. tax law and later in the attempt to class it as a non-essential, not only has been purged of what stigma that did attach to it as a luxury, but has come through with shining colors as a public utility.

Heretofore there was no occasion for analyzing and classifying the automobile's status to determine its relation to the general welfare, but when the question was brought up by some men who would stifle the industry, the great mass of proof that was brought out to show the utilitarian value of the car soon dispersed the calamity howlers. Only recently the government indirectly recognized the car as a public utility when the fuel conservation order closing the factories on Mondays was changed to exempt the garages, which were classed as public utilities. Big industrial leaders have called attention to the fact that the widespread use of the motor car is more essential in the present situation than ever and that every man owes it to himself, as well as his country, to own and operate a car, since without one he is not as efficient as the man with one.

Time will probably show that in passing through the war crisis the automobile industry underwent a transformation for the better through having its product and its service to mankind analyzed and placed in the class with the plow, harvesting machine, steam engine and other public utilities. This action has swept away a great handicap in the automobile trade, which while not exerting much influence up to the time of the war, would certainly have become potential had it not been removed and the way cleared for the dealer to sell the automobile as a medium of service, which it really is, effecting saving in time, money and health in the average man's life. The salesman now goes out with a business like proposition and sells a man service in the form of a motor car. His whole selling argument is based on a sounder business proposition, a fact which cannot help but constantly work for increased sales from now on.

Everyone is familiar with the progress and benefits incurring to civilization from the application of steam and electricity for illumination, facilitating travel and lightening the manual burden of humanity. This familiar story has been written from every angle and is even found in the school books, but seldom, if ever, has attention been called to the gigantic importance of the internal combustion engine as an economic

factor, and yet upon examining the effect of this invention upon man's mode of life and habits, it is immediately apparent that the gasoline engine has extended its influence throughout the world and to an enormous extent in all progressive civilized countries in both times of peace, as well as war. In every walk of life, one or many of the functions necessary to society is aided through the gasoline engine in some one of its numerous applications. This fact draws attention to the hitherto unmentioned heritage that came to civilization when the gas engine was invented. It has fostered hundreds of inventions besides the modern perfected automobile. In fact, these offspring of the so-called gasoline motor have made possible the navigation of the air, submarine navigation and a greatly extended travel throughout the land. They have been the inspiration for the creation of many potential articles of war, as well as peace.

As the British tank is floundering

A Public Utility
"There is nothing in the order of January 17 to prevent the operation of automobiles; motor vehicles of all classes being considered as coming under the head of Public Utilities."

This classification of the automobile was given by the United States Fuel Administration in answer to the inquiries from motorists and automobile dealers all over the country.

across the trenches in Flanders propelled by the gasoline engine, the same form of power is driving the tank's prototype in far off Canada and the United States producing food, while the driver is guided by an aviator far aloft, sustained by a more perfected engine of the same type. Wireless and telephone messages go out on a gasoline generated current of electricity and dozens of other mechanical functions necessary to the prosecution of war, gain their power from the same source.

On the sea the gasoline engine is propelling the thousands of fleet submarine chasers that swarm the North Sea and Atlantic in the U boat zone, while the wily submarine chugs its way from danger under the same power. Thousands of gasoline motor trucks transport the mountains of supplies that are continually flowing toward the fighting fronts, which are guarded by field rifles, mounted on trucks and supplied by munition truck trains and convoys.

In practically every stage of transportation the gasoline engine has outstripped its competitors. Motor cars have been tested even on roads at speeds

of better than 110 miles an hour, airplanes have been driven through the air a distance of over 1500 miles without stopping, at a speed of about 80 miles per hour, and very recently a motor boat was driven on Lake George, New York, at the phenomenal speed of nearly 70 miles an hour, which is fully twice as fast as boats were ever able to go, propelled by steam or sail. When the gasoline engine was adapted to the bicycle the latter became a far more efficient and useful instrument of man, relieving him of all exertion in propelling it and increasing its operating radius from a few miles a day to several hundred. The motorcycle is not only seen in use in many commercial pursuits, but also has found a usefulness in war that could not be matched by any other machine, being able to go at high speeds over paths and routes that would practically be impassable to trucks or motor cars.

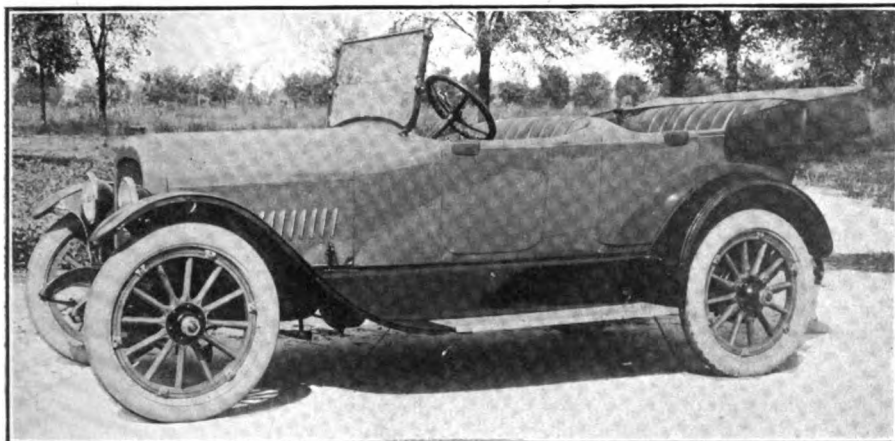
Already far outstripping the steam engine with its ancestry of over 125 years and development for that period, the gasoline engine bids well to take the supremacy of power on land and water, under the sea and in the air. Perfection in production of machinery and mechanical devices, however, has been the greatest boom to man that came directly as a result of the invention of the gasoline engine. This progress in industry finds its most potent exemplification in the modern motor car and truck, which continue to render service over long periods despite the fact that they are made of thousands of parts, most of which are constantly under stress and strain.

There are thousands of passenger cars that have been operated almost continually for six or seven years and still are capable of many more months of service. The public little realizes or appreciates the remarkable instrument of business and pleasure that has been placed in their hands by the motor car industry. If a little more care and attention were shown the cars by their users their utility would extend over much greater periods.

Just at present the very foundation of the country rests largely upon the internal combustion engine, and to an extent that few people realize.

A new era really dawns in the motor industry with this proper recognition of the motor car in its true relation to the interests of mankind. Officials of many of the big automobile companies have called the attention of the public to the fact that the automobile is more indispensable than ever in the service of the country and also pointed out that it has been responsible for the high state of efficiency among business men, professional men and farmers in this country.

With the restoration of peace or during the period of war, the motor car stands as the greatest medium of transportation, a fact which has been established by statistics recently compiled, on the carrying capacity of the 5,000,000 passenger cars and trucks in this country, and it also ranks high, if not at the top, in the order of essentialities.



Kline Kar, Five-Passenger Touring Model, Price \$1495.

Boston Stages Big Show Next Month

Largest Exhibition Combining Passenger Cars, Trucks and Accessories In World

"THE world's greatest retail automobile market," is the expression being used generally in connection with the forthcoming Boston Automobile Show, which will be held in Mechanics building, Boston, March 2 to 9. It is a well founded belief in the trade that the word "show" is antiquated and has outlived its purpose, particularly when used in reference to an exhibition where in one week nearly \$4,000,000 worth of motor cars and accessories were sold.

In past years the Boston dealers have staged one of the largest, if not the largest, exhibition of motor cars and accessories in the world, and this year the exhibition will be more comprehensive than ever, as the Motor Accessory Manufacturers' Association, which in the past has only exhibited at the National Shows in New York and Chicago, has sanctioned the Hub show and is going to exhibit as a body. This action on the part of the greatest organization of motor car parts manufacturers in the world was decided upon as a result of its recognition of the Boston Show as a great retail market.

In point of car exhibits and truck exhibits the Boston Show ranks with the National shows and is without qualification the largest exhibition of commercial vehicles held anywhere in the world. With the M. A. M. A. members represented among the accessory exhibitors the show will this year feature this department as one of the most comprehensive ever held.

Chester I. Campbell, manager of the show, is very optimistic as to the outlook for the exhibition and bases his expectations on the results of the Chicago Show, where he was greatly impressed with the large attendance and substantial volume of business transacted during the show week there. He is also very confident that the wave of timidity which passed over the East has disap-

peared and states that he believes there was no ground for such a feeling and that it had been inspired by enemy propaganda.

"This ridiculous idea that it is unpatriotic to purchase a passenger car while the country is at war is rapidly disappearing," says Mr. Campbell. "In England and France the government is preaching the gospel of business as usual.

"If these countries who have been bled white are making a frantic effort to keep business normal, there is no reason why we in America should not carry on business as heretofore. The passenger car is a vital part of our life and, therefore, it is easy to explain that the Germans' propagandist took advantage of this feeling of timidity and spread their doctrine in order to cripple the third largest industry in the land. The weakening of our industry means the loss of great wealth and, therefore, weakens the government's borrowing capacity."

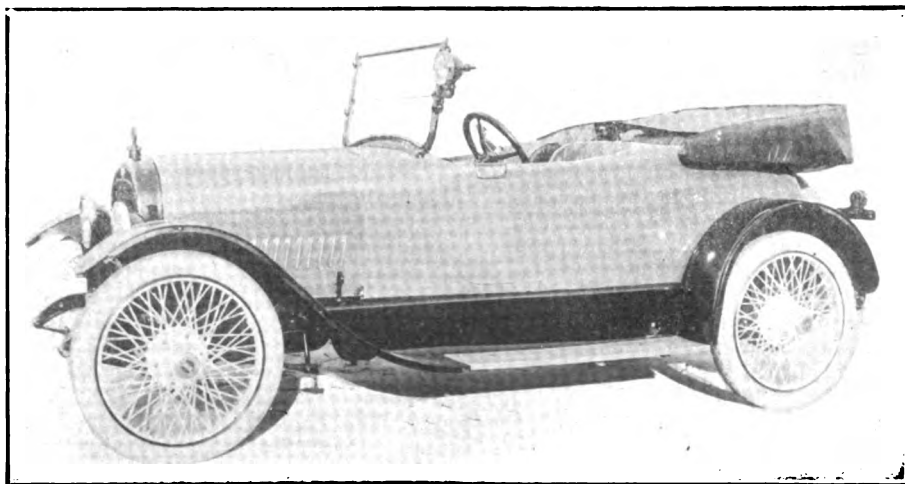
Six Body Styles In New Series Of Kline Kars

THE "Third Series, Model 6-38," as the new season Kline Kars will be catalogued, includes a five-passenger touring car, four-passenger sport touring, four-passenger Shamrock roadster, two and three-passenger runabout and five-passenger sedan with auxiliary seats.

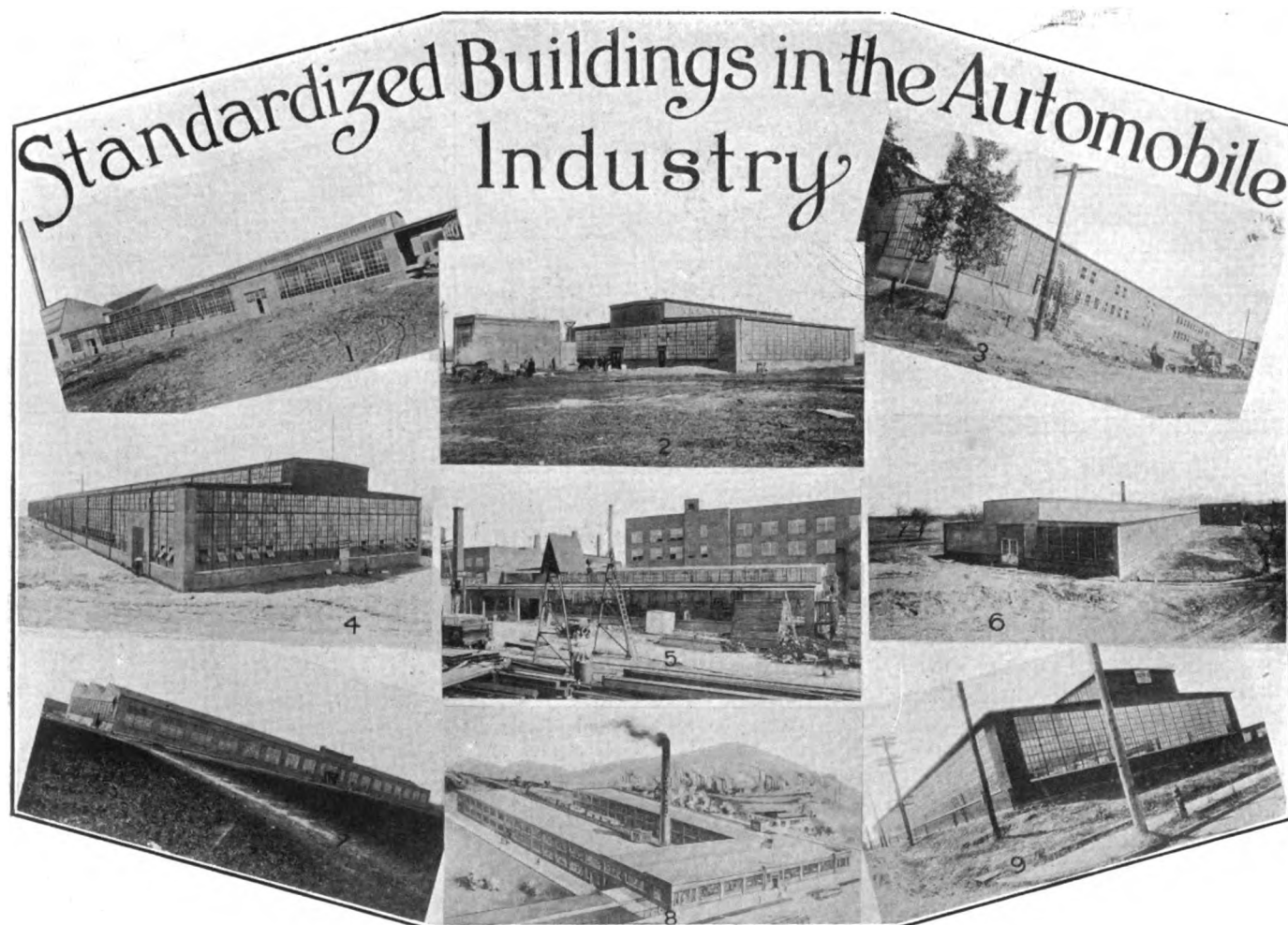
The Kline Kar standard chassis with a wheelbase of 120 inches, which is being used for the third year on all models, has a number of improvements. A higher radiator gives the hood less slope and adds greatly to the appearance of the car. The radiator is of the straight front type instead of V as formerly used. The body is wider at the cowl in front and rear and there is three inches added to the floor line of the tonneau. The upholstery is of straight piped French style of real leather, without buttons.

Changes in suspension have made possible a lower hung chassis without sacrificing the road clearance of 10½ inches. This advantage has been secured through the use of longer and flatter rear springs, which also improves the riding qualities. The standard units as formerly used are used again, including the Continental 7-W six-cylinder motor, Grant-Lees transmission, Borg & Beck clutch, spiral bevel gear differential, roller bearings in axles, annular ball bearings in transmission, Schwarz wheels, Firestone rims, Stewart vacuum system, Rayfield carburetor, Klaxon horn, Boyce motometer, adjustable focusing spot light, Cortland one-man top, Blair top holders.

Exterior finish on the Kline models is of the highest quality, Valentine's paints and Beckwith-Chandler varnishes being used in securing the deep rich lustre that characterizes the bodies. The Kline Kar is one of the few cars made in the South being the product of the Kline Car Corporation, Richmond, Va.



Kline Kar, Four-Passenger Shamrock Roadster. Price, Equipped with Wood Wheels, \$1495; with Wire Wheels, \$1595.



Notable Factories of Standardized Construction: 1, Cleveland Tractor Co., Cleveland, O.; 2, Anderson Tire Manufacturing Co., Washington, D. C.; 3, Jackson Rim Plant, Jackson, Mich.; 4, Pullmore Motor Truck Co., Newcastle, Pa.; 5, Torbensen Gear and Axle Co., Cleveland; 6, Fox Machine Co., Jackson, Mich.; 7, S. S. E. Co., Philadelphia, Pa.; 8, Silvex Co., South Bethlehem, Pa.; 9, Robert Hassler, Inc., Indianapolis, Ind.

WHAT is a "standardized" building? Are not all buildings "standard," or, at least, erected according to construction standards? Doubtless, but the word as is now coming into use in this phrase is a technical term. Standardized buildings are, or may be, erected in great numbers on designs which permit the assembly of material of standard sizes and advance treatment, and are related to buildings erected in the ordinary way as an Elgin or Waltham watch movement is to one turned out by a Swiss maker.

The standardized building is a product of American progressiveness. In the construction of factories and other large industrial buildings it has long been possible to have the steel work come upon the site fabricated in fabricating shops by those who are specialists in this line with all of the special tools and labor saving devices at their disposal. Recently however, advanced builders have gone further than the steel assembly in the laying down of materials ready for fitting together a factory structure much as a child would build his towering structures in the play room with erector toys.

The construction of standardized buildings relieves the mind of the factory operator from the multitude of detail that goes with such work, reducing his problems practically to those of time, the assembly and installation of equipment only, for all the problems of engineering, material supply, punching, riveting, erection, inclosing, finishing and delivering are signed, sealed and settled when the order is given. The type of building which the standardized factory builder erects provides for the use in all places of conventional factory shapes, plates and units, subject to rules, inspection and survey of an agreed authority, both as to quality and material, dimensions and other matters.

How It Is a Commercial Possibility.

The building as thus constructed is a commercial possi-

bility only because identical buildings will suit the purposes of widely different classes of manufacture. They are a possibility simply because mechanical manufacture today involves mainly the useful occupation of certain amounts of floor area, and because careful analysis of industrial plants has conclusively proved that no matter how highly specialized certain portions of these plants may be, there is a striking similarity in 30 to 40 per cent. of the floor space. Hence manufacturers are growing alive to the fact that not every building must be treated as if it were an entirely individual project, but may be evolved from fabricated material of fixed dimensions in quicker time and at lower cost, because the manufacturers know full well that in their own lines that has been the effect of standardization. In addition, the standardized building being limited in longitudinal units by the space available and working economy only, and at the same time susceptible of lateral extensions by the principles of combination or repetition, may be spread on equilateral areas almost as desired.

It is significant that the growing list of standardized buildings includes numerous factories for the production of automobiles and accessories, and also sales rooms. The automobile industry is itself highly standardized both in the parts of its product and in the assembling of the same. Big automobile factories make the most intensive use of the progressive assembly in building motor cars. Now the builders come along with similar methods and build factories for the automobile makers in multiple units on a combination of practically the same two principles. Both industries are indebted to the makers of popular and inexpensive American watches, who are credited in manufacturing annals as being the originators of progressive factory assembly. Thus the automobile being in itself the epitome of standardization, it

is not in the least strange that the structure in which it is made be rendered just as efficient through the same sort of process.

In looking over the illustrations that accompany this article, the sameness of exteriors and interiors might readily deceive one to believe that these utility constructions are commonplace. While the reduplication of a set design may have the disadvantage of monotony when it comes to a matter of artistic assembly, for a civic centre, perhaps, it is to be remembered that these buildings are scattered far and wide over the land, that they house the hands of thousands of laborers who at forge, lathe and anvil, are forging Liberty bonds into every car and automobile accessory they help to produce.

Motor Industry Fosters Development.

Perhaps no other industry furnishes such an excellent opportunity for the development of standardized buildings put up in successive multiples at great savings in time and expense as the automobile industry. Construction engineers may go to whatever lengths they wish in their discussions as to lasting materials, permanence and cost comparisons. These are without the province of this article. The big fact that confronts all factory construction is the production factor. Of late years manufacturers have come to estimate production operations very closely to schedule

factory is ready to start anew a new force must be engaged.

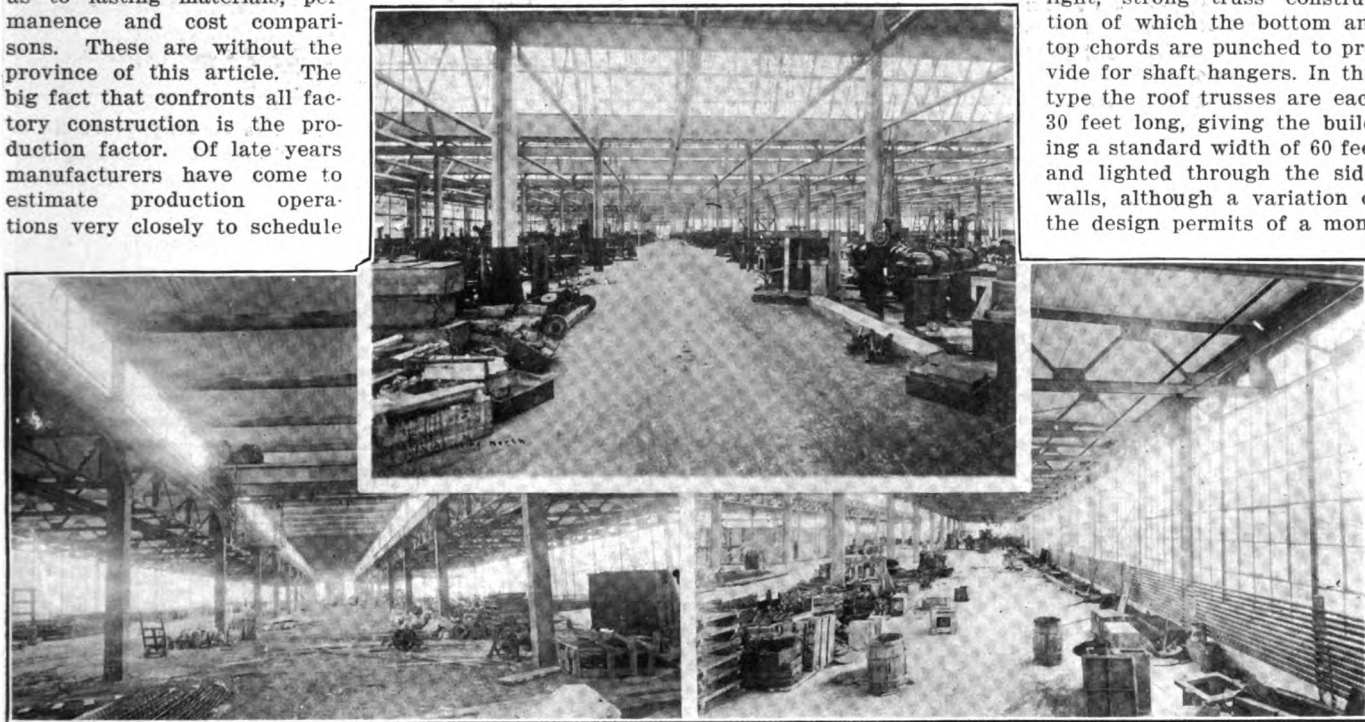
The experience of the Austin Co., Cleveland, O., industrial builders and leading exponents of standardized buildings, illuminates the possibilities of these standardized buildings as adapted to motor industry needs. In three years of production of standard factories they have erected some 30 structures for the automobile industry, including 13 to be used as automobile truck repair sheds by Pershing's men in France. These 30 structures cover about 10 per cent. of their total number of buildings produced in these three years.

Austin Company's Nine Types.

The Austin company manufacture nine types of standardized buildings varying in width, length and number of stories. Three simple types are built in 30 days each; four in 60 days each, while brick mills and multistory concrete buildings are built in quick time, some of them in around 90 days.

The simplest type of building in the Austin schedule, a single-story, flat roof plan, for storage or light manufacturing, is built either with solid columns and beams, or with a

light, strong truss construction of which the bottom and top chords are punched to provide for shaft hangers. In this type the roof trusses are each 30 feet long, giving the building a standard width of 60 feet and lighted through the side walls, although a variation of the design permits of a moni-



Illustrations of Machinery Installations: Above, Moving Machines Into the No rdyke & Marmon Plant; Below, Views of the Fox Machine Co., Showing Crane on the Left and Overhead Steel Truss to Which Shafting Is Hung on the Right.

time, and the onset of the war increased this tendency at a ratio that would be found very high if it were put into figures. The builder of standardized factories steps into this breach, producing good manufacturing buildings, and does it on his own highly scientific production schedule, which brings new factory buildings to completion on or ahead of time.

The erection of a permanent structure in 30 to 60 days is an especially valuable development of American building progressiveness, also for the quick rebuilding service it affords in emergencies. There have been numerous examples of this in the New Jersey munitions plants, and in the automobile industry the situation is not entirely different. There is a certain period of the year in which business is brisk and other periods in which it is slack. If a fire should happen to overtake a plant at the beginning of the busy season of the year the whole year's business would be seriously reduced. Being able to get back into a building in a hurry after a severe fire is a valuable advantage to any owner, saving in interest on the investment, retaining customers sure to be taken away by competitors during enforced suspension and delay, as well as being able to maintain a working force almost to the full strength, for if a factory is put out of business for any considerable length of time because of fire the employees find positions elsewhere and when the

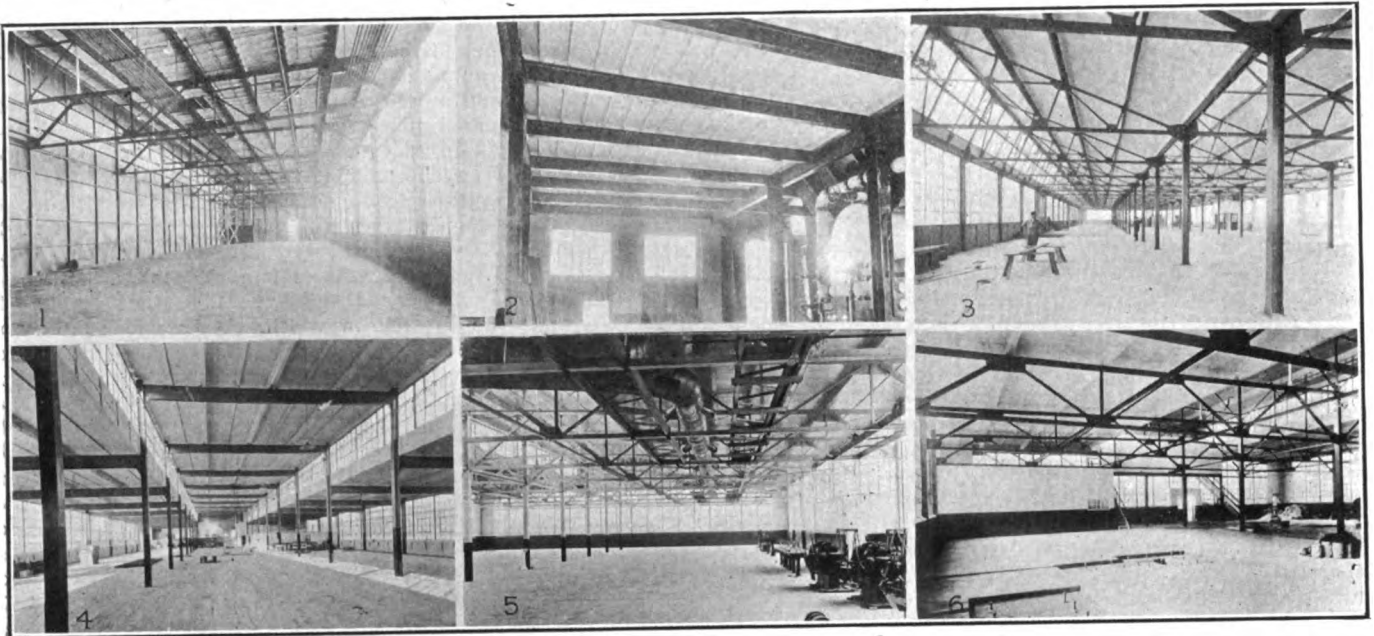
tor. The beams in this structure carry light shafting and a monorail system up to 1000 pounds.

In a 90 foot wide type the standardized building presents three 30-foot aisles of trussed construction or I beams. In these buildings auxiliary columns provide a carry for a traveling crane in the centre aisle, or a monorail may be carried by the roof trusses and beams. In heavy machine shops, foundries or erecting shops which set heavy machinery down this central aisle extra sets of beams carried across the centre aisle support shaft hangers.

Favorite for Automobile Factories.

Their standard number three type has been found most adaptable to the automobile industry. In plan, the width of this model is 100 feet—the economical maximum that can be well lighted through sidewalls and one monitor, and it is built to any length in multiples of 20 feet. In section it is divided by a single line of central columns. The monitor roof is 27 feet three inches clear above the floor and is supported by a chord truss seven feet four inches in height, 34 feet back to back of Ls. The roof and monitor are supported by steel trusses, with 13 feet clearance above the floor. The space between exterior and interior columns is 49 feet 1½ inches from centre to centre of columns.

The specifications of this standard model, so popular with automobile manufacturers, are exceedingly interesting, fairly



Features of Interiors: 1, Wood Block Floor, Pullmore Motor Truck Co.; 2, Long Span Gypsum Tile Roofing, Nordyke & Marmon Co.; 3, Saw Tooth Roof Truss, S. S. E. Co., Philadelphia, Pa.; 4, Monitor of Cleveland Tractor Co., Showing Excellent Lighting; 5, Overhead Construction Carrying Blower and Shaft Hangers, Robert Hassler, Inc., Plant; 6, Anderson Tire Co., Washington, D. C., Showing Tiles in Floor for Machinery.

typical of many of their designs, and are as follows:

Foundations are of concrete, one part cement, three parts sand and five parts stone.

Walls are brick below the sills, laid in cement mortar tempered with lime.

Columns are structural steel.

Sash are of steel, continuous, with factory ribbed glass; clear or wired glass substituted if desired; instead of continuous sash, brick pilasters may be introduced, 20 feet between centres.

A four-light ventilator is installed in each sash.

The roof structure consists of structural steel trusses or I beams, set horizontal to provide level suspension for the shaft hangers.

The purlins are of long leaf yellow pine, six inches by 12 inches.

The floor is of five-inch monolithic concrete; wood or other additional floor as desired.

One field coat and one shop coat of paint is placed on the structural steel and two coats of interior factory white on wood and brick.

Gutters and down spouts are not included except when ordered. Sash operator, plumbing, heating, lighting and sprinklers are furnished as ordered.

This building has only one column to every 2000 square feet of floor space. The bottom chord of each roof truss is composed of two heavy angle irons which are set back to back, an inch apart, and take bolts for shaft hangers at a panel point. Intermediate panel points are punched, providing additional struts where required.

Saw Tooth, High Monitors, Multistory Structures.

The saw tooth building provides another type which is much used from the circumstance that it permits practically unlimited expansion in either direction, with a proportionate increase in daylight evenly distributed throughout the entire area. The standardized builders have developed a temporary panel of angle irons and asbestos covered metal for use below the windows instead of brick walls where future expansion is likely. This permits the factory owner to use the entire side wall over again when extensions are made. Long span concrete or gypsum tiles for the roof are popular in these buildings and are made on the job by the builders' workmen.

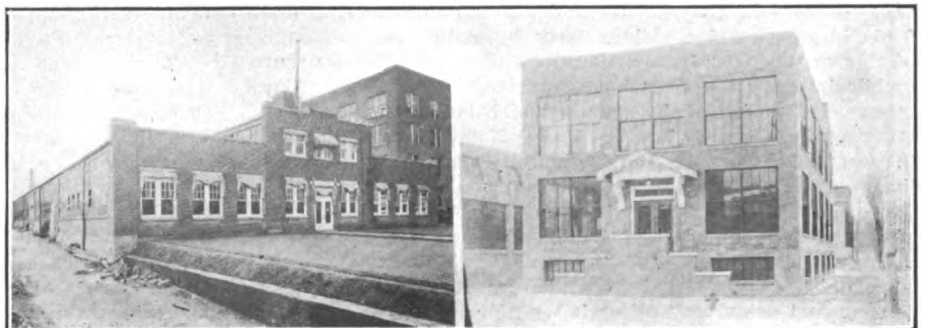
Three larger types are essentially similar in section except as to the width of the centre aisle, which may be

either 42, 47 or 57 feet, with side aisles approximately 31 feet each. In plan they are 104 feet eight inches wide, 110 feet three inches wide, 120 feet two inches wide respectively by any length in a multiple of 20 feet. In each the monitor roof is supported on a peak truss 34 feet clear of the floor and a traveling crane is carried the width of the centre aisle on the aisle columns. The roofs of the wing bays are supported by trusses, with 14 feet eight inches clearance above the floor. Purlins are of steel and roofs of corrugated iron in this type of buildings, which are used by various large companies in the metal trades industries.

These standard factory builders also construct multistory structures, with steel columns and girders, or with wood beams. The lessons of intelligent repetition have been found applicable here no less than with the skeletonized structures of the ordinary single story factory. Mills with steel or wood between brick pilasters are constructed in multiples of 16x20 feet bays and quick time is feasible from ground floor to roof. Reinforced concrete buildings are also erected on standardized designs by the same builders, which in length and width may be in any multiple of 20 feet—the characteristic bay length of Austin Standard Buildings. Builders generally accept that a 20x20 foot panel is standard in flat slab design, requiring for a given load the minimum of reinforcing steel per square foot. The standard designs include both flat slab and beam and girder buildings.

Some Typical Instances.

The two Austin buildings that would illustrate the most points of interest to automobile manufacturers and others interested in studies of standardized buildings would probably be the Jackson rim plant at Jackson, Mich., and the



Left, Pleasing Exterior of Torbensen Axle Co., Cleveland, O., a No. 2 Standard Building; Right, Jackson Rim Co., Office Building.

Nordyke & Marmon plant at Indianapolis. The Jackson plant is an Austin Standard No. 3 design, measuring 100 feet by 360 feet, with monitor roof and a single line of columns down the centre. Fifty foot trusses give comparatively clear floor space. The Nordyke & Marmon building is a No. 4 saw tooth structure, 300 feet square. This was a 60 day contract.

The choice of materials is fairly well standardized. Structural steel in large quantities is carried in stock or under orders ready for immediate shipment. Wall materials—either brick or factory steel sash—are also in stock. While tile roofing is preferable, composition or wood is supplied from stock as desired.

Methods and operations: The success of Austin standard buildings is intimately associated with its organization of methods and operations. It can readily be understood that a description of this in all its ramifications and intricacies could not be undertaken within limited space. Builders crews are seen at work on every hand every day. It is detailed plans, a place for everything that makes orderly procedure possible. Just as a huge circus tent is put up and taken down the same day through system and repetition, so standardized buildings are susceptible to systematic erection—and they do not have to be taken down as the circus tent.

"There is a carpenter at every row of nails to be driven," the superintendent of a Michigan plant says of the Austin system. "The men keep abreast of each other as they advance along the rows; and each man works as though he believed that if he took time to spit the whole building operation would be delayed." Austin 30 day buildings are the result of standard operations as well as of standard design and materials. The crews follow (or rather precede, usual-

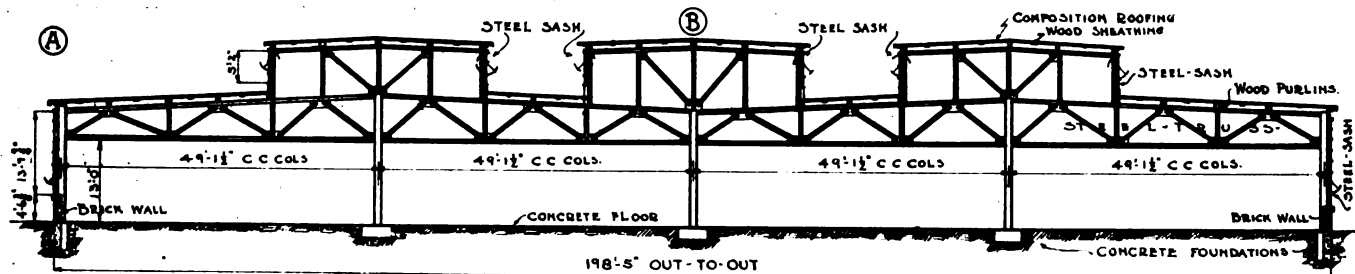
is shown for the gypsum tile called pyrobar—fire proof, fume proof and non condensing—instead of wood. This decreases the chances of dampness. The tile is white and, therefore, affords excellent light refraction. As for the advantages of good day lighting, the interior of the Jackson Rim company plant, shown on another page, affords an example of this. The abundance of steel sash and the wide monitor make for an unusually well lighted building. In the Nordyke & Marmon building the same end was attained by the use of 10 feet of saw tooth sash every 30 feet. In the plant of the Cleveland Tractor company a No. 2 type, measuring 90x200 feet, the excellent lighting facilities were emphasized by painting the interior white.

Objections to be overcome in the matter of floors pertain mostly to prejudices of skilled artisans to working upon concrete floors instead of wooden floors. This contention, it is understood, is less forceful than formerly and the era of opposition to concrete floors may be readily passing. Many modern factories are provided with maple wearing surfaces to obviate this very objection. In this connection it is to be observed that concrete floors predominate in the standardized buildings for the automobile industry.

Overlaid wood floors are from the employee's viewpoint a necessity. They are commonly adopted in standardized buildings. The Cleveland tractor has overlaid wood. The Jackson plant has first concrete, then a hemlock sub floor, and over that the finished maple. The Pullmore factory has a wood block floor.

Accommodating Machinery and Equipment.

The final consideration of interiors of standardized factory buildings for the automobile industry involves the placement of machinery and equipment. The standardized



Cross Section Plan Showing How Two No. 3 Standardized Buildings Are Linked in Combination, Giving a Building 198 Feet 5 Inches Overall in Width.

ly,) all materials to the site of the proposed building. Special men handle the very routing and tracing of all material, insuring its delivery ready for handling even in freight congestions.

Covering, therefore, as the preceding discussion has shown, factory buildings from the simplest to the most elaborate from the standpoints of utility, stresses and materials employed, standardized buildings may be bought to order from a catalogue in the same way that an automobile or a tire pump may be obtained.

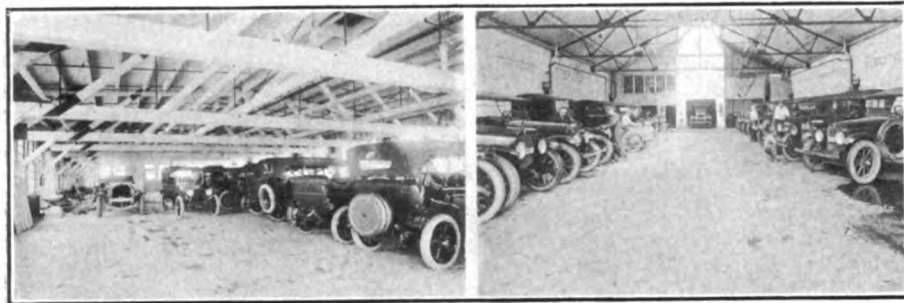
Building Needs of the Industry.

It still remains to be said that for its buildings the automobile industry has its demands, some shared in common with all industries, some with a few others and some peculiar to itself.

The lighting, ventilation and floors are problems in common with many other industries. Through scientific study the trade is absolutely aware of the fact that working surroundings of men have a great deal to do with their efficiency as producers. The greater the light the greater the increase in the efficiency of the workers because there is less strain on their eyes, and in the monitor roof or flat slab buildings it is possible to secure much better ventilation than in the beam or beam and girder types. The foremost men of the automobile industry are increasingly adopting measures for conserving the efficiency of their employees. In many ways, therefore, the automobile manufacturers who are using standard factories are encouraging this tendency. Take the problem of factory roofing. The roof over an employees head may not be hygienically so important as the floor under his feet, but it is nevertheless important. Much favoritism

building must afford ease in the installing of machinery, whether it be a mill construction or reinforced concrete building, simply because it is a structure to be devoted to factory purposes. In light manufacturing the increase of group drive has eliminated shafting and pulleys to a degree, especially in the mills handling automobile fabrics, accessories and other light manufacturing. In others, as has been shown in preceding treatment, arrangements are made for the installation of traveling cranes, monorails, pulleys and shafting in the roof structure of the single story standardized types. In the multistory structures a system of inserts installed in reinforced concrete floors gives the most perfect adjustability to the attachment of machines or shafting. Very heavy machinery is readily bolted to concrete floors where inserts are left for the purpose, and this accommodates presses and planers in an automobile factory, or a progressive assembly bed, which may be a stretch of hundreds of feet of movable platforms and conveyors.

Among the Austin standardized buildings for the automobile industry is shown a typical machine shop erected at Jackson, Mich., for the Fox Machine Co. This machine shop itself is considered as part of the equipment. Here the roof system has been expanded vertically and horizontally as it were, and used to carry all the counter shafting, heating and ventilating pipes. In plan the building is 90 feet wide by 313 feet long, with an office 40x48 feet at one corner fronting on a street intersection. In section the main building presents three aisles, each approximately 29 feet six inches wide. The monitor roof is 21 feet three inches clear above the floor and is crane equipped. The roof on the wing bays is supported by light trusses, with 13 feet clearance



Left: Interior Peerless Auto Co., Clevel and, O.; Right, Hudson-Stuyvesant Garage Room, a Spacious Floor Under Steel Roof Trusses.

above the floor. Exterior columns are of eight-inch I beams. The centre aisle columns are a built up 15-inch I section above the crane. Longitudinal column spacing is 24 feet. Walls are of nine-inch brick, on concrete footing, up to a sill three feet seven inches above grade. Steel sash, factory ribbed glass compose the walls above the sills to the eave line.

What demands particular attention is the use of light steel trusses, eight feet on centres, in the two side aisles. Ordinarily, in engineering economics, a span under 36 feet is better taken care of by a beam than a truss. In this case, however, it was desired to utilize the roof system to support shafting—and so light steel trusses were used, eight feet on centres, carried at the wall and at the monitors by longitudinal trusses. While from a strictly engineering viewpoint this might not have been the most economical construction, yet in the long run, taking into consideration the fact that the lower chords of these trusses, built of light channels, back to back and one inch apart, become an ideal system for the taking care of shafting, the roof as constructed supplies an ideal method for taking care of shafting in standardized building constructions. In keeping up with the newest and best equipment, which means replacement and substitution from time to time, changes can be quickly and easily made with an effective shaft hanging unit every eight feet. In this way the roof system becomes a definite part of the equipment; the building serves the operation. Further, not only do the lower chords of these trusses serve as shafting and machinery supports, but the space above the lower chord is a fine place to run heating and ventilating pipes. The heating pipes resting on the lower chord do not affect the tar roof.

Since Austin Standard designs are already flexible in regard to length, they are usually found suitable for the installation of machinery without further variations in width or height. Occasionally, however, additional height is necessary. For instance, in the case of the tractor plant for the Pullmore Truck Co., Newcastle, Pa., a special height of 18 feet under the trusses was necessary for the installation of overhead shafting and traveling crane and the required combinations supplied from Austin stock steel promptly took care of the variation from type design.

Turning to garage interests the

best example is the Hudson-Stuyvesant building in Cleveland. Standard designs were here adapted to efficiency in a building 50 by 179. The front portion, 50 by 60, was built in three stories. On the ground floor, of course, was the show room; on a mezzanine floor were the offices and on the two upper floors were workshops, repair rooms, etc. The rear section, 50 by 120, was the garage proper and receiving room. Here a trussed roof made possible absolutely clear floor space.

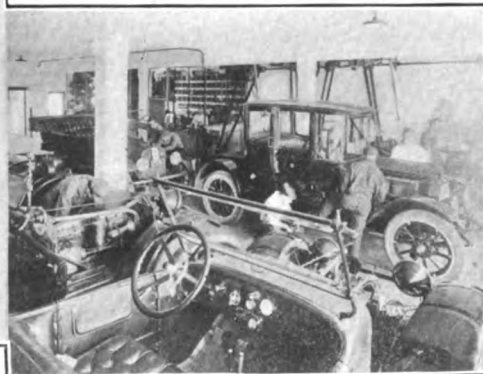
Many construction details tend to economy. Take for instance the new 10-foot gypsum tile roofing used for first time in that length on the Nordyke and Marmon plant. The 10-foot idea is an Austin idea for economy. The light weight of the tile makes it easy to handle and economical of supports. The unusual length decreases the number of purlins and in consequence the number of truss members; and also allows the purlins to be stressed to maximum capacity.

Garages and Service Stations.

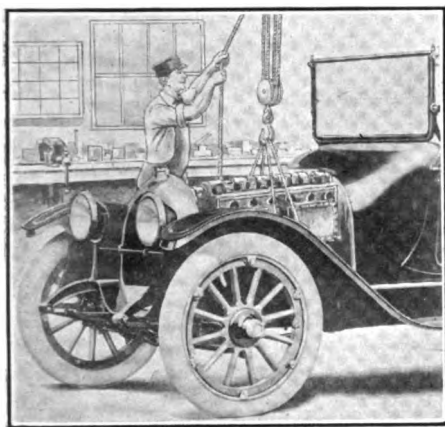
In garages and service buildings it is exceedingly necessary to have wide spacing, and builders cannot span very long distances with wood and still obtain average strength and rigidity. Nevertheless, some excellent structural results have been obtained in the standardized types, both in the structural steel and mass concrete designs.

On sales organization and service buildings particularly, as well as in large factory construction of the multistory type, in frequent instances, the automobile manufacturers specialized in recent years on flat slab reinforced concrete construction. High labor costs, advances in materials and especially railroad congestion have more recently made decided inroads on this program, and due to these and other war conditions factory demand is more today for light than for massive structure.

The number of automobile firms building in flat slab construction currently, making due allowance for war altered plans, is very great. The Ford Motor Co. of Detroit now has over 50 flat slab buildings, located in practically every city in the United States, and their main plant at Detroit is almost entirely flat slab. In like manner the Willys-Overland company started about two years ago to build service stations throughout the United States and they have spent something in the neighborhood of \$10,000,000 a year on flat slab building and structural steel buildings with concrete floors. It is not possible to enumerate here all the companies which have gone in heavily for buildings of massive concrete construction, but the Packard, with a large and widespread service station program; the Pierce-Arrow, Chevrolet, Buick, Oldsmobile, Chalmers, Paige-Detroit, Peerless, Lozier, Ford and a number of other companies have built practically all their recent buildings of this type. This list could be extended to include all the prominent manufacturers of automobile accessories, such as Continental Motors Co., Springfield Body Co. and a number of others.



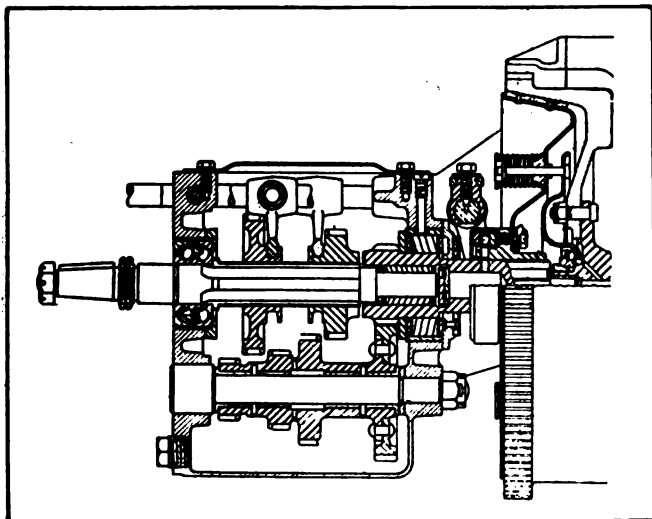
Office, Display Front and a Scene in the Repair Room of the Hudson-Stuyvesant Garage in Cleveland, O., an Excellent Example of Standard Designs Adapted to Efficiency.



Overhauling *The* Automobile

THE OLDSMOBILE

This is the 15th of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The 16th article of this series will appear in the Feb. 25th issue of the Automobile Journal.



Sectional Cut of Transmission and Clutch Used on Oldsmobile Models 44 and 45.

BOTH model 44 and 45, 1916 and 1917 Oldsmobile cars are built upon practically the same design, aside from changes in sizes and the counter-balanced crankshaft in the model 45, there are but two real points of difference that require a change in detailed directions from overhaul. These differences are in the fan and generator mounting and in the oil pump. The generator on the model 44 is bolted to the back of the timing gear housing and is driven by a chain, while the generator on the model 45 rests upon the top of the gear housing, carries the fan and is driven by a belt from the crankshaft. The oil pump on the 44 is in the timing case rather than on it, as is the 45. Other

small differences will be taken up in the course of the story.

For an eight-cylinder V type engine this machine is extremely simple and practically all parts are accessible for repairs. The first step in the overhaul is the removal of the radiator. To drain the cooling system, remove the plug in the water inlet tube, or open the petcock located at the lower part of the pump housing and crank the engine over once or twice with the hand crank to allow the escape of water above the pump.

The tie rod, which is held by a pin and cotter pin to the top of the radiator, should next be unfastened and swung back against the windshield. Two bolts fasten the lower part of the radiator to the frame, remove these and unfasten the three water hose connections. The radiator may then be taken from the chassis.

Disconnect and remove the two water tubes which lead from the cylinder heads to the carburetor manifold jacket, and after the secondary wires have been disconnected from the spark plugs and the studs removed, the cylinder heads may be taken off, exposing the cylinders and firing chambers. Scrape off all carbon and clean the water jackets in both the heads and cylinder blocks with a stiff wire.

If the overhaul is to be extensive the carburetor and manifolds may be removed at this point. Two types of manifolds were used on the model 44, one was continued and used on the model 45. The first type of intake manifold was not fitted with a water jacket and was straight across the top, having the carburetor bolted to a flange underneath. At each end flanged elbows make the union between the manifold and the combination exhaust and intake manifold.

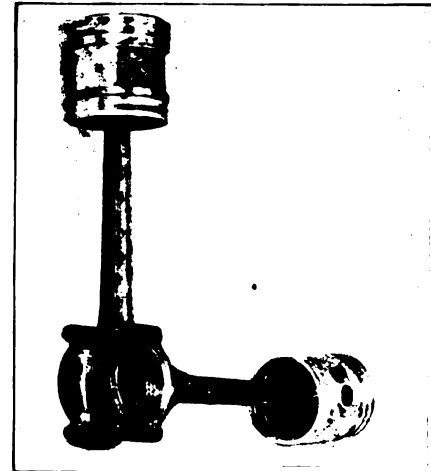
The later 44s and all 45s were fitted with a combination water jacketed intake manifold which was fastened directly to the intake-exhaust manifolds by cap screws. The combination intake-exhaust manifolds were bolted directly to the exhaust pipe, which in turn was fitted and connected with the pipe leading to the muffler by a union. All of the manifolds and exhaust pipe back to the muffler pipe should be removed, leaving the engine clear for further repairs.

Before disconnecting the manifold or carburetor, the vacuum tank cock should be shut off and the gasoline drained from the carburetor. The control rods to the carburetor may be disconnected at the carburetor end and lifted out of the way.

Removing Valves.

The conventional U shaped lock washer is used for retaining the valve springs and spring cups. The removal of the springs may be accomplished by compressing the springs with a valve spring compressor, the removal of the U washers and the lifting out of the valves.

The valves may next be ground, being careful to keep the grinding compound out of the cylinders, valve pockets and valve stem guides. After the valves have been ground the valve stem guides should be inspected. The guides should fit the valve stems with little or no play, though they should not be so tight as to bind. Any leakage at these points materially reduces the engine power, since



Connecting Rod and Piston Assembly Model 45 Oldsmobile.

the ingoing air dilutes the gas mixture.

Should inspection show a leakage at any valve stem bushing the bushing should be driven out from the top with a metal bar and hammer and a new one substituted. As a general rule most of the wear occurs in the bushing, though after a time the valve stem itself may be worn slightly. Inspection before grinding will reveal this and if new bushings will not fit the old valves new valves should be used.

A careful examination should be made of the cylinders for scratches or scores. If the compression has been good the cylinders will probably be found in good condition. Small scratches or scores may be filled by the graphite method after the engine has been reassembled, as follows:

With the engine running at normal speed, slowly pour three or four teaspoonfuls of flake graphite into the air intake of the carburetor. After application the spark plugs should be removed and cleaned.

Deep scores may be filled by the plating method or by welding, both of which repairs are only possible at shops equipped for this sort of work.

Taking Off Generator and Fan.

The next step in the overhaul is the removal of the generator and fan assembly. Disconnect the wires at the storage battery and after tagging all wires unfasten them from the generator, coil and starting motor. Remove the distributor head and lift off the secondary cable enclosures, together with the wires.

On the early model 44 the generator is bolted to the back of the timing gear case. Remove the bolts and cap screws and this unit can be taken from the engine. After the fan oil tube (first few cars only) has been disconnected from the timing gear case remove the four cap screws which fasten the ignition unit and fan housing body to the timing gear case and remove the ignition fan assembly. After the two cap screws on the ignition unit have been removed this unit may be lifted off.

The fan on this model is keyed to the shaft and retained by a spring lock washer, which may be pried open and off with a screw driver. The fan may then be pulled from the shaft with a

wheel or gear puller. Both fan shaft ball bearings are retained by plugs, which are threaded into the housing. When these plugs have been unscrewed the bearing outer races may be driven out from the inside, if necessary, with a wood rod and hammer.

On the latter 44s, though the generator was bolted to the timing gear case in the same manner, the fan and distributor unit were somewhat differently arranged. In this model the timer unit is removed by unscrewing the set screw in the timer housing and lifting the whole unit out of the base. The fan housing may be unbolted from the timing gear case and removed. The fan on this model is fastened by a key and nut on the end of a sleeve and may be removed with a wheel puller if necessary.

Should the ignition unit, coil or generator require repairs, they should be either returned to the factory or carried to an electrical expert.

The generator and fan unit of the model 45 is mounted on a swivel bracket and to remove the unit take out the wing nut bolt at the top of the strap which binds the generator. The generator may then be lifted from the engine, with the timer-distributor attached. This last unit is retained by three nuts on long bolts passing through the generator. Only the nuts need be removed.

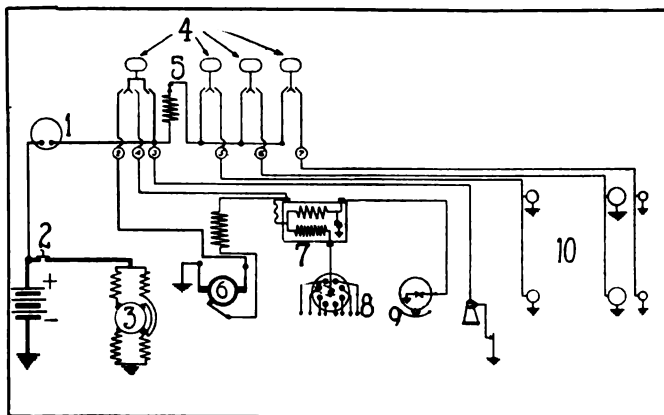
Water Circulation.

Both models were fitted with centrifugal pumps, which may be removed after the water inlet and outlet connections have been disconnected, and on 45 after the two cap screws fastening the pump body to the block have been removed.

The pump shaft or rotor on model 45 is driven from the camshaft through a clever little device that protects the pump from damage due to frozen water. This device is a semi-split clip, which

fits into slots in both the cam and pump shaft and will break in event of a freeze up, before undue strain is put upon any of the rest of the cam or pump mechanism. One should exercise due care in replacing the pump to be sure that this split clip is in place or the pump will not function.

Lubrication on both models is had by a gear pump. In model 44 the pump



Wiring Diagram: 1, Ammeter; 2, Starting Switch; 3, Starting Motor; 4, Ignition and Lighting Switches; 5, Generator Cut-Out; 6, Generator; 7, Ignition Coil; 8, Distributor; 9, Timer; 10, Lighting Circuits.

is mounted directly upon the crankshaft and its removal will be taken up later in this article. The oil pump on model 45 is located below the crankshaft on the timing gear case. To remove it disconnect the two oil tubes and remove the cap screws which fasten the pump to the case. The pump may then be pulled downward and forward and removed.

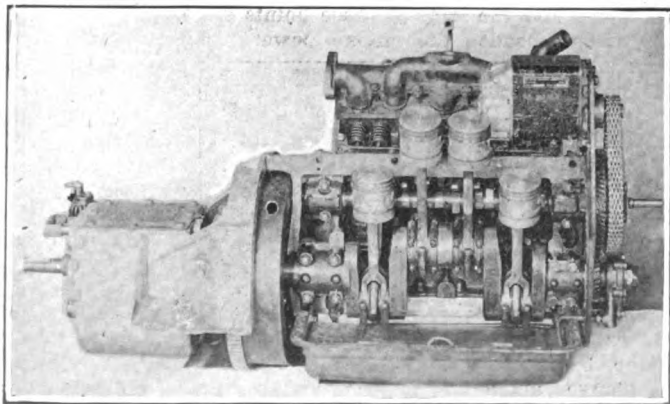
For connecting rod repairs the oil pan may be removed from the base of the engine, though it is impossible to make any repairs to the crankshaft bearings through the base. Take out the 20 bolts which fasten the oil pan to the crank case and remove the pan.

The oil pan should be given a thorough cleaning and the old oil discarded, for the use of old oil, which usually contains carbon, metal grindings and other impurities, is poor economy.

Through the base the connecting rods may be examined and removed if necessary. The connecting rods are mounted in pairs, or two upon one crank pin. The outer or Y shaped rod carries a long babbit faced bronze bearing, which is retained by two connecting rod straps and is scraped to fit the crank pin. The inner connecting rod is clamped upon the bearing, between the ends of the outer rod, and is fitted to the groove in the bronze faced bearing.

In fitting the connecting rods to the crank pin the utmost care should be observed to get the proper clearance between the inner rod and the bronze bearing. Fit the babbit to the crank pin in the outer or Y rod in the usual manner by scraping. Then wind a piece of shim stock, three-quarters of an inch wide and not over .0015, preferably .001 of an inch thick around the bronze bearing, but do not lap it over. Next clamp the inner rod over the shim stock around the bearing and shim it until the fit is tight, but does not bind. Then remove the rod and the shim strip and after replacing the rod again the fit will be .002 larger than the bronze bearing.

The valve lifters are mounted in a detachable cage or frame and may be removed from between the blocks at this point. The push rod assembly may then be removed from beneath. The rolls on the push rods and the pins upon which



Model 44 Engine With Left Hand Block Removed; Showing Crank Case Arrangement, Pistons and Connecting Rods.

the rolls are mounted should be carefully examined for wear in the pins will be apt to cause uneven valve action.

Removing the Engine.

If further repairs are necessary the engine must be removed from the chassis. After the clutch release arm has been disconnected the crank case bell housing bolts removed and the transmission supported by means of suitable blocking, the engine retaining bolts should be taken out and the engine, by means of block and tackle, lifted forward and upward until free of the chassis.

On the model 44 remove the four cap screws which retain the hand crank sleeve and take off the cranking device. The front engine swivel hanger bearing may then be removed. On the model 45 the crank ratchet should be removed

under block is cast integral with half of the crank case and the parts are bolted by lateral bolts at the top. The right side carries the main and camshaft bearings. The next step in the disassembly is the removal of the left casting. When this is done all necessary repairs may be made to the camshaft or main bearings. The removal of the main bearing caps permits taking out of crankshaft.

A careful inspection should be made

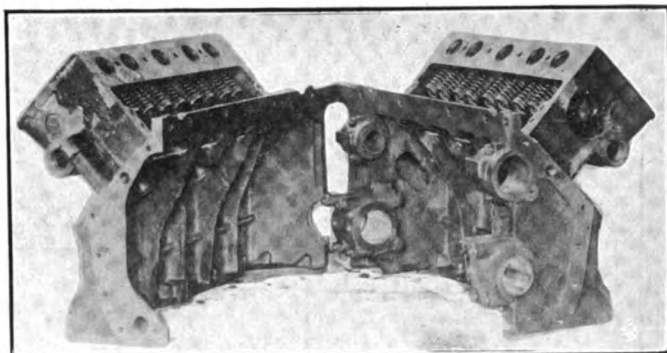
of the flywheel retaining screws, and should the flywheel be loose upon the crankshaft flange the screws should be examined. It is essential that the cap screws at this point fit the holes in the flywheel; if they do not new cap screws should be used when reassembling.

As has been said above the lubrication is of the force feed type, and on this account a careful cleaning of the oil channels and piping will be necessary. The crankshaft, camshaft and piston assembly, as well as all of the oil tubing, should be soaked in kerosene oil to loosen the gummed oil, which should be cleaned out with a stiff wire.

In removing the clutch assembly from the flywheel the four clutch springs must first be released. These are re-

tained upon studs in the same manner as the valve springs by U shaped washers. The springs may be compressed with a Y iron, using a length of rope around the engine block as a fulcrum. When the springs have been removed the clutch cone may be taken out.

The clutch spring support is retained in the flywheel by a ball thrust bearing, the inner race of which is fastened to



Engine Blocks; Showing Integral Construction of Cylinder Blocks and Crank Case, Also Main and Camshaft Bearing Arrangement.

the crankshaft by a retaining nut, screwed to the crankshaft extension stud. The clutch fabric facing should be cleaned with kerosene oil and examined. If it is not broken away or badly worn it may be given a treatment of neatsfoot oil and replaced; otherwise it should be renewed.

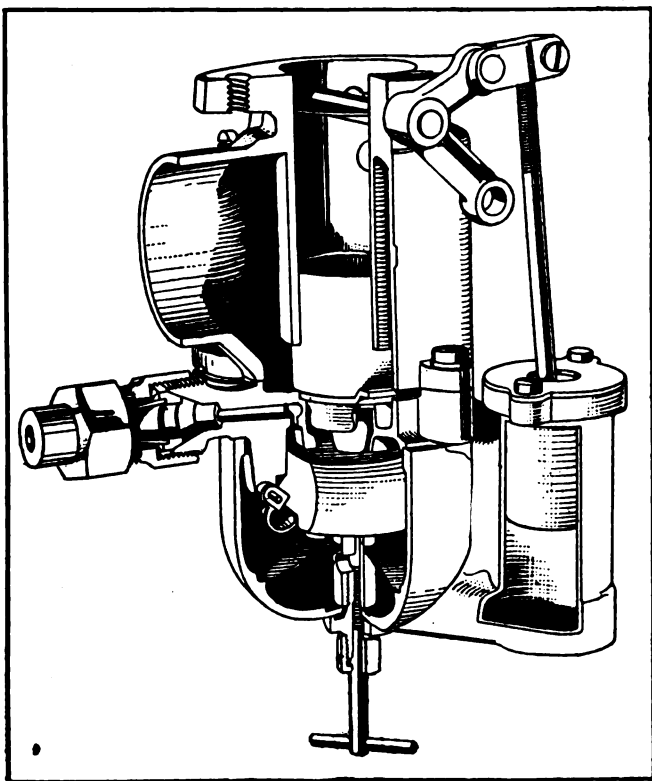
After the cover has been taken from the transmission and the universal joint back of this unit disconnected, the transmission may be removed from the chassis.

Disassemble the universal joint and remove the retaining nut on the end of the main gearset shaft. The universal joint flange may then be pulled from the shaft. Covers over the main shaft bearings permit the removal of the bearings. Remove the covers, each of which is retained by four cap screws, and the two parts of the main shaft may be removed, from the front and rear, leaving the sliding gears in the case.

A castellated nut, mounted on the end of the countershaft, retains that member in the case. Remove the cotter pin and nut and the countershaft may be pulled out from the back of the case with a wheel puller, leaving the four gear combination in the case.

The reverse idler pinion gear is exposed upon removal of the cover plate on the right side of the transmission case and retained by a set screw and lock washer on the side of the casing.

(Continued on Page 47.)



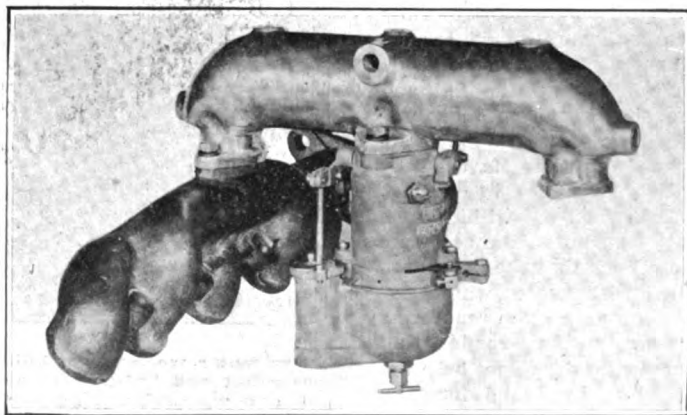
Cross Section of Carburetor.

and the fan pulley pulled from the shaft with a wheel puller. The front timing gear case may then be unbolted and removed, exposing the timing gears, and the pump on model 44. The crank ratchet nut should next be unscrewed (from model 44).

Disconnect the oil tubes from the oil pump on model 44, and with the crank ratchet lock nut out of the way unscrew the crank ratchet and slip the pump from the shaft.

The camshaft timing gear and generator drive sprocket are keyed to the shaft and retained by a collar screwed to the camshaft. When the collar is removed both gears may be pulled off if necessary with a wheel puller. The timing gear on the crankshaft is also keyed, and may be pulled off in the same manner.

A feature of this engine consists of the split crank case casting. Each cyl-



Water Heated Intake Manifold with Carburetor and Combination Intake and Exhaust Manifold Attached.



An advance model "Palmer Garment" motor coat of shower proof green mixture. The large collar which buttons close to the throat is of Green Sports Cloth. A new and novel feature is the smart belt, which slips through the front and buttons in the back.

(Courtesy Percival B. Palmer & Co., Chicago, Ill.)

New Creations for the Winter Girl

By Mrs. A. Sherman Hitchcock

sweet scented pine roads and the country places of the millionaire contingency are kept open, where their friends who motor find teas and afternoon visits a very pleasant diversion. Many of the motor cars that descend upon Lakewood contain a full sporting arsenal and bright and early each morning the hunters are up and out in the forests. On some of the delightfully mild days—of which there have been but few this winter, unfortunately—luncheons have been a popular diversion and the luncheon is sent ahead with tables and chairs by the servants, who arrange it for the motor-party and among the pine trees they partake of the viands with a keen relish.

The wardrobe of the northern motorist who takes her drives in the crisp winter air and goes forth as a motoring huntress is somewhat different from that



One of the very newest "Palmer Garment" motor suits made Eton style and showing all the new spring ideas. Navy serge is the material and collar, cuffs and reverses are of Quaker Gray Broadcloth, while the bottom of the Eton jacket is finished with yarn embroidery in Quaker gray.

(Courtesy Percival B. Palmer & Co., Chicago, Ill.)

THERE is another class of motorists beside the southern travelers who migrate from the temperate latitudes at this time of year, but these are not in search of pleasure such as the American Riviera affords. They are out for bigger game and if they are good shots they get it, too, up North, where they have real winter in the winter season. Hunting trips are a very popular sport for the men and women who enjoy outdoor life and have time at their disposal. This year many of the fashionable motorists have been traveling northward, there to enjoy the hunting sport, while nearer home the winter sojourners at Lakewood, N. J., have taken up the fad and are shooting from their motor cars as the most approved pastime favored by society.

Lakewood is within such easy touring distance from New York that the hotels are filled with guests who largely comprise the motoring fraternity—the roads that penetrate the pine belt are of white sand and form an altogether enticing feature to lovers of the motor car. The motorists make many tours through the



Every motor woman is a knitter in these days. This smart motor hat and knitting bag are made of printed khaki-kool silk and are designed to go together. The bag may also be used to hold some other little necessities for a motor trip. The suit is made of rose tinted khaki-kool silk and is as strictly tailored as any cloth suit and no material is more practical or attractive for the motorist.

(Posed by Dolores Cassinelli, the Essanay Star.)

of the southern sojourners whose days are spent in dressing, luncheon, motoring, dinner and the endless round of pleasures. Her hunting togs and a few substantial, practical garments for motoring, with maybe one dinner frock, is all that her luggage contains. The dinner frock is included, but may never be worn, especially if she goes to one of those camps where festal clothes are absolutely forbidden, and the garb which greets everyone at breakfast gathers again around the board at night time in company with brilliant complexions, shining eyes and keen appetites. With the temperature well below zero in the northern country, one selects good, warm clothing, sufficiently heavy to give the necessary protection, but free from bulk. Tramping around through the woods clothing becomes heavy all too soon, and one tires easily beneath their weight and the dainty lingerie which is all very well at home has no place in the motor woman's hunting outfit. Knickerbockers of fine, closely woven serge or cheviot are substituted for silken ones, and petticoats and outer skirts are cut sufficiently short so as not to

interfere in any way with one's progress, or that of the party. A woman may be a splendid shot and a fine motoring companion, but if her skirts are such that they are forever catching on something and necessitating the services of a masculine member of the party to disengage her from a branch or rock, she will soon be looked upon as an intruder. Leather is perhaps the most serviceable material that could be chosen for the hunting suit. It is impervious to cold and dampness, and though it may scratch it does not tear. In its soft, woody brown shades it is just the thing for this use, toning artistically with the woodland surroundings and being less conspicuous to the eyes of game.

A smart suit, which is both picturesque and appropriate for a motor hunting trip, was recently turned out by a prominent designer for a well known woman of society. Ooze calf with its soft velvety surface was made into a coat suit and trimmed with shiny brown kid. The short skirt came just to the tops of the high waterproof cowhide hunting boots and was a model slightly flared and bound at the bottom with the kid stitched flat over the calf. Topping this was a semi-fitting coat with kid collar and cuffs, straps and buckles which fastened the double-breasted fronts. A brown brushed wool sweater rolling high around the neck was worn with the suit instead of any kind of a separate blouse, and a brown woolen Tam O'Shanter cap and brown gauntlet gloves were the attendant accessories which set off this outfit. Furs and plenty of them are really essentials in the motorist's wardrobe for winter climes. One may wear almost any kind of frock in the motor car so long as it is covered with a voluminous fur garment calculated to protect both the wearer and the frock at the



New model Sweater Coat made of imported Brushed Mohair Yarn, with Byron collar. It comes in blue, pink, corn, purple and other modish shades. A practical garment of smart style and excellent fit. (Courtesy Morgan Knitting Mills, Inc., New York City.)

same time.

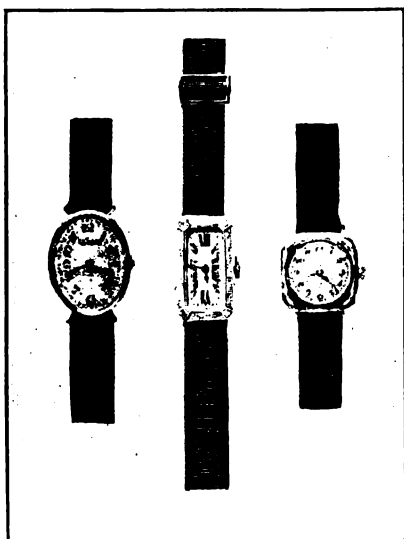
With the thermometer registering zero and below and fuel scarce, the gay, bright hued spring clothes for motoring, being featured in the shops, alone give promise of pleasanter days ahead, very close for those departing for the South, and only a short time distant from any of us, and after months of unseasonable weather, motoring will come into its own again with real sunshine and balmy air. The wise woman will have her wardrobe complete so that she will not be obliged to spend her time indoors when she might otherwise enjoy life in the car.

The noticeable avoidance of anything approaching the outre in motoring fashions is eloquent of the smart woman's sense of decorum. The distinction of being well dressed for the motoring sport is accorded only to the woman whose individual good taste bids her attire herself in a manner that is perfect harmony with the times and her environment. The motor frock craze has achieved colossal dimensions and designers find it difficult to keep pace with the insatiable desire of the motor woman for new and original styles in this popular garment. There is nothing better than the mohairs for motor dresses and the Blue Bonnets and Minerva Plaids are strongly in evidence. They are extremely smart, made rather plain with a tailored conception but with details in

finish or trimming which give them much chic. A Blue Bonnets serge in the checked pattern in a sand gray is buttoned closely with gray buttons all the way down the shoulder and outside of the sleeve and has fitted cuffs and a high fitted collar of white Rodier fabric. This fabric is the very newest and smartest of silk fibre Jersey Cloth and will be one of the most popular materials of the coming season. It is a closely knitted material, resembling exceedingly the knit underwear in stitch, but of so beautiful a quality and sheen that it will be pre-eminent among popular materials. It is also possessed of a wonderful durability and will be practical as well as smart for motor wear.

The spring suits are very attractive and distinctly new and are unusually good for wear underneath the cover-all coat. The jackets are short and the skirts narrow. Vests are being introduced and pockets left off. One sided trimmings are being used, even to the point of single large revers. Suits that simulate dresses are one of the new novelties.

With the early spring weather, when fur coats and fur lined wraps are put aside, the cloth wraps spring into prominence once more. The shower proof mixtures are always an excellent selection in the motor coat and are bound to give great satisfaction. A new model, called the "Trench" coat, is almost as military as the officers' coat and yet it is no caricature of the latter, but just a sensible army cloth garment in khaki color or military blue. It is well equipped with pockets and is very warm.



There is no part of the motor woman's equipment more necessary than the Wrist Watch of reliability. Here are three of the very newest models in the most exclusive and original designs. Aren't they beauties? And the very best of it is they are thoroughly reliable and may be depended upon every time. (Courtesy Gruen Watch Manufacturing Co., Cincinnati, O.)

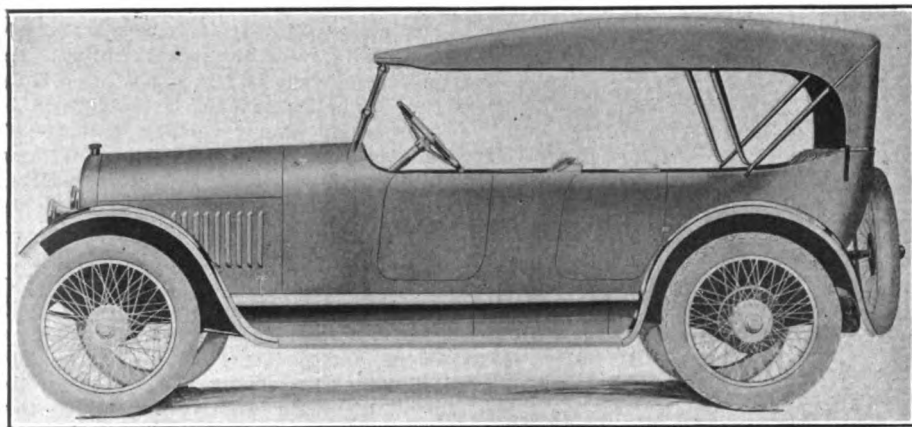


A wonderfully protective Cape Wrap of Hudson Bay Sable, made purposely to wear over the cloth suit or coat. Easy to put on and to remove, it is the ideal wrap for this time of year and to wear until really warm weather comes.

(Courtesy William Jackman's Sons, New York City.)

King Cars Used in Many Lands

New Eight-Cylinder Engine is More Efficient, More Economical and Runs With Minimum of Noise



Model EE Four-Passenger Eight-Cylinder King Foursome.

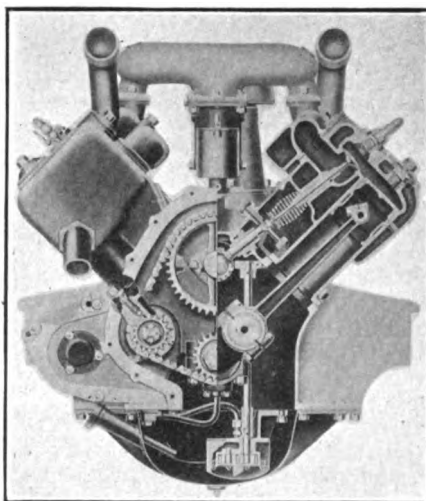
THE King Motor Car Co.'s eight-cylinder product, while only in its third year, is probably one of the best known makes of cars in its class throughout the entire world, a reputation that was earned largely through the many remarkable tests conducted by the company in demonstrating the power and flexibility of the engine, which is rated at 60 horsepower. Many thousands of miles were covered with these cars with the gears locked in high and the severest kinds of roads and grades were negotiated to demonstrate that the car was amply powered to meet any emergency and to prove the strength of the parts to take the strains and stresses of extraordinary operating conditions when called upon to do so.

King cars are found in nearly 50 different countries, which is tangible proof of their serviceability under most every condition where it is possible to operate any automobile. The King chassis is also on trial in the government service, where a number are proving their worth in the hard going of ambulance work and for the lighter armored cars.

In the 1918 line of King cars but little change is found in the outward appearance, but in the chassis there are a number of changes that have been worked out during the season in production. Externally the main difference that appeals directly to the eye stands out in the lines and finish of the top and a slight difference in the proportions of the seats.

Mechanically the feature of the improvements is a jacketed intake manifold which greatly assists in the thorough vaporization of the gasoline, a scientifically proven principle in effecting economy in the consumption of fuel, as well as greatly increasing the efficiency of the engine. A new type of Atwater Kent Ignition is being used, the brake on the propeller shaft has been removed and both brakes

are now on the rear wheel drums. A new camshaft and mushroom tappet design of valve mechanism has been de-



KING REFINEMENTS.

Showing Heated Intake Manifold, Mushroom Tappets and Barrel Type Valve Spring.

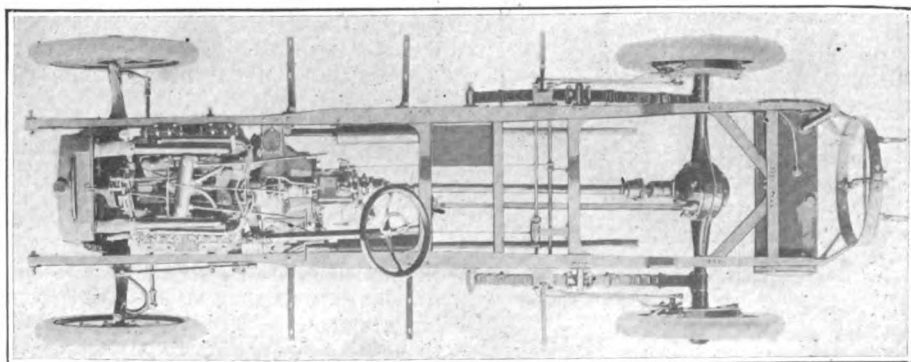
veloped, which is extremely quiet, and while the King engines last year were noted for their quietness, it is claimed that this new assembly has eliminated the noise from the engine to an extent that when it is in operation only the sound of the air entering the carburetor emanates from under the hood. The use of Morse silent chains on the front has been another big factor in reducing the engine noises to a negligible state.

The speedometer is now driven by a pair of spiral gears entirely enclosed in the rear of the transmission and an 11-tooth Bendix gear has been developed which gives greater reduction between the starting motor and the flywheel and permits the use of a lighter and more compact starting motor. The use of a Bijur starting and lighting system is another change made during the year.

In its principal points the King chassis is continued unchanged, with a wheelbase of 120 inches, and the cantilever, rear spring suspension, which has been used by the company since it started production. The King eight-cylinder engine is the V type, 3x5, and is made at the King shops. It is in unit with a dry plate clutch and a three speed transmission. The power is transmitted through a two-joint shaft to the full floating rear axle.

Columbia axles are standard equipment for both front and rear and they are equipped throughout with Bock taper roller bearings. A ball bearing in the top of the knuckles of the front axle makes possible a very light pressure on the steering wheel in directing the course of the car.

Four different body models are furnished on the one chassis, a seven-passenger touring car, a four-passenger foursome, three-passenger roadster and seven-passenger convertible sedan. The great effort expended in perfecting the remarkable King power plant has not led to any neglect in the design of bodies, either as to quality, line or finish, the King bodies being luxurious, roomy and modern, and having complete standard equipment. The seven-passenger touring car and three-passenger roadster sell at \$2150 f. o. b. Detroit; the foursome at \$2300 and the convertible sedan at \$2950.



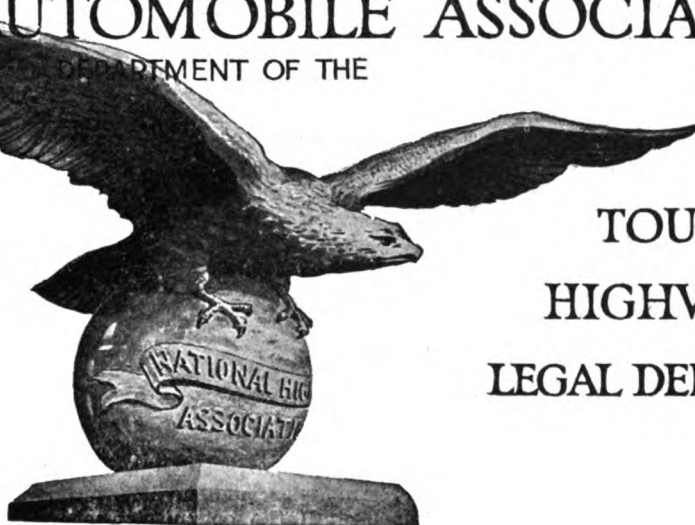
Extra Cross Member and Braces at Rear Stiffen King Chassis Against Weavings. Note Long Torque Arm.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Important Motor Bills Up in Bay State

Additional Taxes, Headlight Rules and Other Regulations Proposed in Automobile Measures

THE Massachusetts Legislature is at present considering the latest crop of legislation through its various committees and the public hearings on a number of the bills are under way. Some of the legislation is recommended by motorists and is directed against many of the evil driving practices of unthinking car operators, other bills are designed to discourage car thefts, while still others are in the class with the annual grist of superfluous impracticable laws that, while presented in good faith, have nothing to recommend them.

Motoring organizations will be well represented at the hearings to see that a vigorous protest is registered against any unreasonable or unfair measures, but individuals also should register their protests with their representatives against the enactment of laws that unfairly discriminate against their interests, or that would serve to restrict their rights. Particular attention should be directed against the attempt to place a surtax upon the motor car in Massachusetts as provided for in bill "Senate No. 222," which accompanied a petition of H. B. Endicott and is intended as a means of raising additional revenue to meet the present war emergency. This bill would levy the following additional taxes on the motor car and operators:

"Five dollars if the registration fee now provided by law is less than \$15, otherwise the sum of \$10.

"On all motorcycles registered for use in the current year, the sum of \$1.

In Case of Trouble

Motorists who are stopped by the police, or complained of for violations of laws and regulations, or who are involved in an accident, are naturally disposed to do everything that might be expected from respectable people, but this disposition and attitude are often misunderstood and misconstrued. We offer to our members, therefore, the following suggestions:

Give your name and address to any officer who may request it, or such party as may properly be concerned in the accident.

Do everything possible in an accident to assist or to alleviate the suffering of injured parties.

Remember that you are not obliged to "explain things" to an arresting officer or injured party.

The safest thing to do is to act courteously, but keep your own counsel.

Do not enter into arguments or controversies.

Make observations, measurements, take the names of witnesses and their stories of the affair.

Then call up the Legal Department of the association for advice or assistance.

If you wish legal advice as to your rights and liabilities communicate with the Legal Department at the head offices of the association, 9 Park Street, Boston, Mass., and immediate attention will be given to these matters.

If the emergency arises for immediate action by local counsel consult our attorney nearest to you.

Consult the Legal Department in any event before presenting or settling claims.

"On the first five vehicles registered by a manufacturer or dealer, the sum of \$5, and \$1 on each additional car registered by such manufacturer or dealer.

"On each truck or commercial vehicle the sum of \$2.50 for each ton of carrying capacity.

"On the license of each operator or chauffeur, the sum of \$2."

Just why the motor car owners have been singled out to pay a tax for the benefit of the entire community when they are already subjected to three direct taxes that are not imposed upon others, is difficult to learn, and has not been satisfactorily explained as yet by the backers of the bill. The government in recently exempting the garages in the fuel conservation order, classed them as public utilities and in so doing recognized the passenger car as a public utility, which fact would preclude the only excuse that could be found for directing against the motor car owners and operators a fourth direct tax, which from any angle could be looked upon only as unfair discrimination, since the motor car serves the same purpose as a horse drawn vehicle, trolley car or train.

It is doubtful if the legislature will impose the surtax, but in any event the thorough thrashing out of the question will result beneficially, as it will bring out the motor car in its true form as a public utility, a fact which a few old fashioned people refuse to recognize despite the preponderance of proof in its favor.

Resume of Proposed Motor Car Legislation

THE Massachusetts Highway Commission, in its recommendations for legislative action sent to the Legislature on Jan. 2, recommended a change in the laws regulating the type of headlights and presented an act in which the suggested provisions of the amendments to the law are set forth.

In making the recommendations the commission states that the existing motor vehicle laws properly enforced are entirely adequate and, on the whole, are producing extremely good results.

Massachusetts Leads

"The same is true of the regulation, made in October, 1915, concerning headlights," the report states. "While some motor vehicles still continue to violate the regulation, a large majority have taken pains to comply with it and to do away with glaring, dazzling headlights.

"It is extremely gratifying to find that while Massachusetts was about the first state to adopt a regulation defining what headlights should and should not be used, the regulation which was adopted has been adopted almost in identical terms in practically every state which has since enacted any law or adopted any regulation on the subject. What is needed is a proper enforcement of the regulation by the police in the various cities and towns.

"Several extremely satisfying headlights have been made, however, which are very well liked by the owners and operators of the cars on which they have been installed, although they do not comply with our statute if strictly construed. The statute requires two white lights on the front of an automobile, and one white light on the front of a motorcycle.

"Yellow or Amber Tint"

"The special lights mentioned in the foregoing paragraph have a yellow or amber tint, which, if the light behind them is properly adjusted and is not of too great a candlepower, furnish an extremely good driving light, enabling the operator to see the whole road and still the other users of the highway are not dazzled.

"The commission would, therefore, recommend that an amendment be made in the statutes to permit the use of such lights, and presents herewith the draft of an act to accomplish this purpose."

With this amendment enacted the law as affecting the use of lights will read as follows:

"Every automobile operated during the period from one-half hour after sunset to one-half hour before sunrise shall display at least two white lights or lights of a yellow or amber tint, and every motorcycle so operated at least one white light or light of a yellow or amber tint, which shall be visible not

less than 200 feet in the direction toward which the vehicle is proceeding, and every such motor vehicle shall display at least one red light in the reverse direction."

Another bill providing for a similar amendment was also introduced in the House.

An act entitled "To Require the Examination of Applicants for Licenses to Operate Motor Vehicles," and introduced as senate No. 50, provides that the Massachusetts Highway Commission shall cause all applicants for licenses to operate motor vehicles, to pass such examinations as to their qualifications as the commission shall require, including a practical road test in the operation of motor vehicles; and no license shall be issued until the commission or its authorized agent is satisfied that the applicant is a proper person to receive it. This provision, however, would not apply under the act to applicants for licenses limited to the operation of motorcycles, to persons licensed to operate motor vehicles in this state prior to the date on which the act would take effect (Sept. 1st of the present year), nor to licensed non-residents who shall have passed examinations, acceptable to said commission, in the state or county in which they reside.

Act Is Superfluous

The need of any such act is not apparent, as the bill does not change the present law under which the commission has this power to act, or would it increase this power of the Massachusetts Highway Commission in regard to the examination of applicants for license to operate motor vehicles. At the present time under the statute the commission has the right to order the examination of all license applicants if they deem it advisable. The proposed legislation apparently intends to make the examination of an applicant for a license to include the practical road test regardless of whether or not in the opinion of the commission the applicant needs such an examination.

The bill has been introduced for the past several years and has been strenuously opposed by the Highway Commission on the ground that under the old system, taking into consideration the number of operators of motor vehicles, there have been but a minimum of accidents. In view of this fact no change in the present law is required.

Lime Light For Cops

An act accompanying a petition of the Massachusetts Automobile Operators' Association under the title of "To Promote the Efficiency of Traffic Officers," introduced in the senate as No. 51, provides that a light of sufficient intensity to render traffic officers plainly visible to drivers of vehicles and pedestrians,

be thrown upon them after sunset in all cities, towns and districts providing such officers at street crossings or intersections of highways.

This idea has been utilized in Detroit and other large cities at some stations and is a good one, but is hardly practicable to be indiscriminately enforced throughout the state as proposed by the act.

Another act accompanying a petition of the Massachusetts Automobile Operators' Association provides that it shall be unlawful to operate a motor vehicle with a spotlight, so-called, and the two white lights required by law, in simultaneous use. Violation of the act would be punishable by a fine.

Such an act is looked upon as unnecessary legislation, as the present statute now in force as to dazzling rays can take care of the unlawful use of spotlights as provided for in section 27, chapter 534, of the acts of 1909.

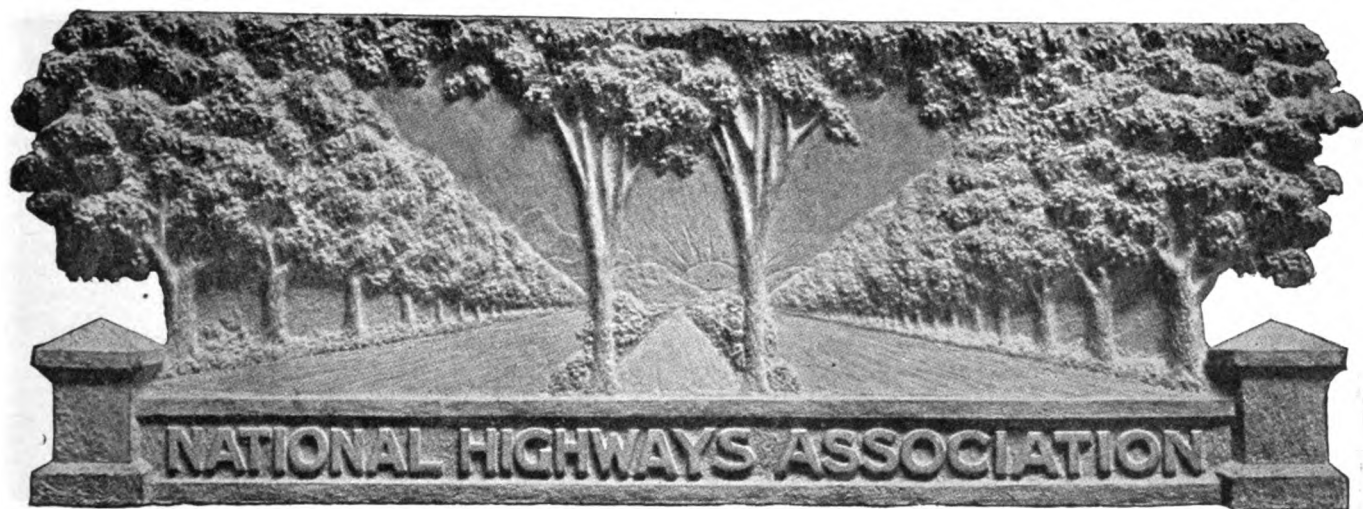
Fix Ford Fee at \$5

House bill No. 140, accompanying a petition of Roland D. Sawyer, would fix the registration fee of Ford automobiles, except such as are wholly used as commercial motor vehicles, at \$5. This act would hardly be passed in its present form and perhaps might be amended so as to receive favorable consideration by leaving out the word "Ford" and inserting instead "every automobile of less than 23 horsepower, \$5."

Two acts have been introduced in the House, Nos. 523 and 525 respectively, which will probably receive serious consideration this year, as they bear upon and seek to prevent the theft of automobiles. House bill No. 523 would provide a fine of not exceeding \$500 or imprisonment for not less than one year, nor more than 10 years for stealing an automobile or motorcycle, or receiving same with the knowledge that it had been stolen, or for concealing any automobile or motorcycle thief, knowing him to be such.

Concealing Identity

House bill No. 525 has similar provisions to one enacted in New York state which makes the erasing of manufacturers' numbers from automobile motors illegal. The bill provides that any one who knowingly buys, sells, receives, disposes of, conceals or has in his possession any motor vehicle from which the manufacturer's serial number or any other distinguishing number or identification mark has been defaced, covered, altered, concealed or destroyed for the purposes of concealing or misrepresenting the identity of the said motor vehicle, shall be punished by a fine of not more than \$200 or by imprisonment for a term not exceeding six months, or by both fine and imprisonment.



Regulations For Middleborough

The Massachusetts Highway Commission has issued an order setting forth the special regulations affecting the use of motor vehicles in the town of Middleborough. These regulations were recently made by the Board of Selectmen of the town and after a hearing were declared to be consistent with the public interests. The order is as follows:

No person shall attempt to turn a motor vehicle around on Center street by going ahead and then backing, but shall drive ahead until the street is wide enough to turn in, or until he can turn or back into a side street.

No motor vehicle shall be left standing on the following named sections of streets for a period longer than 20 minutes at a time: Wareham street, between Benton and Main streets; on the westerly side of School street between Center and Pierce streets; Everett street between Center and Arch streets; Center street between Main and Union streets.

No motor vehicle shall stop within 20 feet of a crossing or within 10 feet of a hydrant.

No motor vehicle shall stop in the centre of a street, but shall be driven as near as possible to the right hand curb and then stopped.

Whoever violates any of the provisions of the preceding sections shall be punished by a fine of not exceeding \$20 for each offense.

WOULD ELIMINATE THE INTOXICATED DRIVERS.

Francis M. Hugo, Secretary of State of New York, who, in his official capacity is head of the largest motor vehicle bureau in the world, that state having registered 410,000 motor cars last year and licensed about 135,000 chauffeurs, states that the problem confronting the state in preventing fatalities from automobile accidents is of the first magnitude.

"Any number of remedies are being suggested," he says, "but the best re-

sults, to my way of thinking, can only come by the elimination of the reckless and sometimes drunken driver and by impressing upon the pedestrians that they must also do their part. New York state magistrates have of late been imposing severe sentences on the reckless and drunken drivers with a salutary effect."

REVERE BEACH BOULEVARD.

Motorists throughout New England will be pleased to learn that one of the most beautiful shore drives in Massachusetts, known as the Revere Beach Boulevard, may be open for its entire length next summer on Saturdays, Sundays and holidays. Heretofore from June 15 to Sept. 15 of each year a part of this boulevard has been closed to motorists on these days, in order to prevent dangerous congestion. Legislation has been proposed which will make that part of the boulevard, which was formerly closed, a one-way street.

Our Letter Box

From time to time it is thought advisable to call the attention of the members to the fact that the Association's Legal Department is constantly alert to handle any of their troubles requiring legal assistance, and as nothing brings out more clearly the activities of the organization in this work than members' letters commending the service, one of recent date is submitted as follows:

National Automobile Association,

Boston, Mass.

George H. Power.

Dear Sir:—I have your letter of Jan. 25th and I wish to thank you for your work. It speaks well for the association and its officers. Enclosed you will find a check for the amount of \$18 which I understand will set me clear on the slate with Mr. _____ and the _____ Co.

Mr. _____ may rest assured that when I buy another _____ car I would rather go to Frisco to purchase it than give him any of my business, and if I can give him any advertising in this section I surely will do so and will not charge him anything for it.

Thanking you again for your labors, I beg to remain,

Yours truly.

Proposes Traffic Director

Robbins B. Stoeckel, State Commissioner of Motor Vehicles of Connecticut, suggests the establishment of the office of state traffic director as a means of handling the various phases of motor car operation in their relation to state regulation.

"The time will soon come," he says, "when it will be necessary to have a state director of traffic, automobile traffic will be so heavy that it will be the only way to handle it. Such an official would have charge of the automobile laws of the state and one of his duties would be co-ordinating the laws of this state with those of other groups of states, such as the New England states for example.

"Not only will there be a state director of traffic in Connecticut in time to come, but there will be such officials in all the states of the country. As it is now what is all right in one state may be all wrong in another, and automobilists going from one state to the other are liable to get into embarrassing situations. By dovetailing all these differing state laws and pruning them down to agree with one another, there will be certain fundamental laws applicable to one state as well as to another.

"Then a man going from Connecticut into Massachusetts will find practically the same laws in force that have to be followed in Connecticut."

ARTIFICIAL GAS CAR IN OPERATION IN NEW YORK.

The first motor car in this country, operated by illuminating gas, recently appeared on the streets of New York City. It was equipped to use gas as an experiment by the Consolidated Gas Co., the gas being held in a steel container 45 inches long and nine inches in diameter, and the mechanism is so arranged that the chauffeur can regulate the feed of fuel from his seat. Large numbers of gas driven cars are used in Great Britain.

PLATE 16.

TWO CAR GARAGE FOR PROFESSIONAL MEN

**Equipped and Appointed to Give Maximum Service to Physicians
and Others Who Have Use for Automobiles Both Day and Night**

THE man who keeps two cars recognizes the value of a substantial garage, properly equipped and with convenient appointments, as it is not only an economical factor in the operation of the cars, but greatly enhances their service value. A garage of this type, plan and detail of which are shown on the opposite page, is designed for the use of doctors, public officials or others who find the use of their car imperative at any hour of the day and night and who employ a chauffeur. Such men find the need for two cars, a driver in constant attendance and must have a car at hand in good operating condition to be pressed into service at a moment's notice. To secure this type of service from the car it must be housed against the elements, kept warm in winter and surrounded with the necessary means of making repairs and replenishing the gasoline and lubricant containers. As such a structure would be erected on an estate or plot with a home costing from \$8000 to \$10,000 or more, it would need to be of more than ordinary appearance and while the accompanying elevation shows a building meeting these requirements, the effect is not produced by any unnecessary expenditure to accomplish that end.

This garage is 32 feet long and 22 feet wide and affords ample room for two cars. The car space measures 20 feet in width by 18 feet in length, leaving ample room for passage around the cars and access to the closet and work bench.

The length of the work bench may be varied, leaving room for a small lathe or drill press at one side, which may be run by a small electric motor.

One end of the garage is designed for the chauffeur's room, from which a door opens into the boiler room at the side. At one end of the boiler room ample space is provided for the storage of coal. The balance of the space is taken by a toilet room, provided with one large window.

The interior walls are four inches thick, of brick, and the ceiling is covered with plaster laid on metal laths. Brick is placed in between the studding of the exterior walls and covered with plaster. The outside walls are of stucco, with a roof of the hip type.

The concrete foundation walls should extend at least $3\frac{1}{2}$ feet below the grade and should be made of a mixture of one part cement, two parts sand and five parts coarse gravel or crushed

stone. Time and labor are saved in laying the concrete floor at the same time the foundation and walls are installed.

The floor is composed of two layers; the first, which should be laid on well tamped ground or over a layer of cinders, is three inches thick and composed of one part cement, two parts sand and five parts of gravel or crushed stone. The second or upper layer should be at least one inch thick and made up of one part cement and two parts sand.

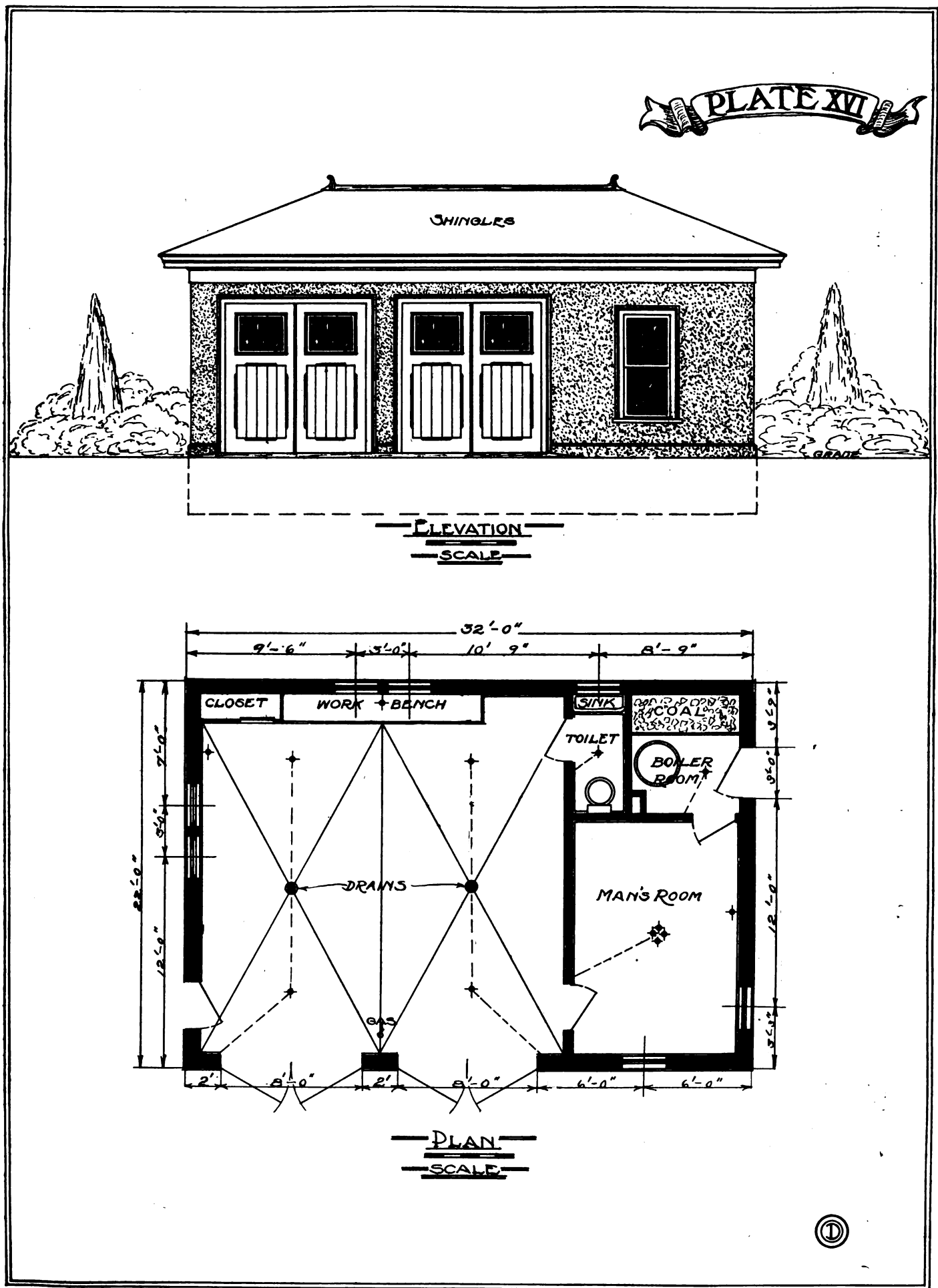
The roof is built up on a 4x4 inch plate, which is made by nailing two 2x4 inch joists together, with 2x6 inch hip rafters and 2x6 inch jack rafters, set two feet apart. North Carolina $\frac{7}{8}$ inch matched pine roofer is nailed on the rafters and covered with extra shingles, laid $4\frac{1}{2}$ inches to the weather. A tin saddle board with ornamental ends is shown, but wooden ones may be used without greatly marring the finished appearance of the roof.

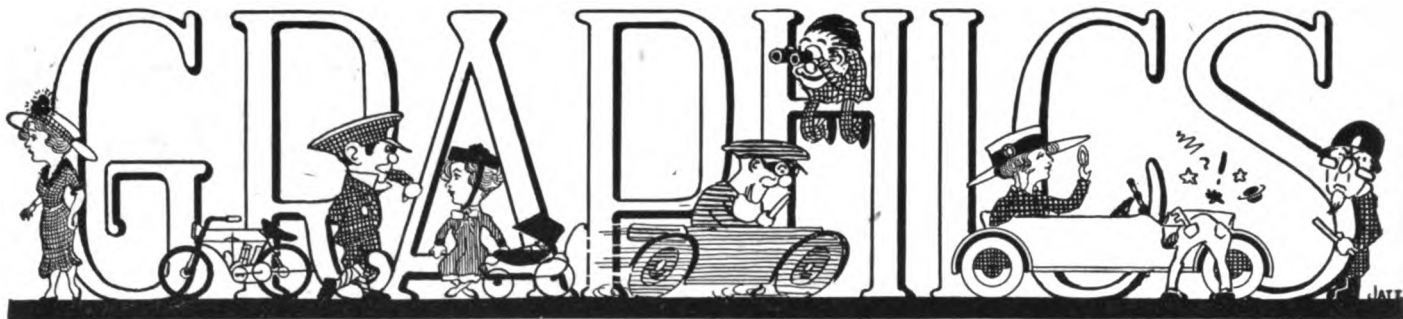
Either white pine or cypress stock may be used for the outside woodwork, of which there is very little. Full provision for lighting is made by two large double windows in the car room, two single windows in the chauffeur's room and one in the toilet room. These windows may be hinged to swing or hung on the frames.

All four of the large car entrance doors are fitted with lights and the two doors opening into the furnace room should be fitted in a like manner. To avoid the necessity of opening the large doors for entrance a smaller door is placed in the left side.

Though the fitting of two large doors, rather than a single one, entails somewhat greater expense, this lay out is desirable because it obviates the necessity of manouvering the cars in the garage, and the attendant danger of damaging them. This feature should be of particular interest to the doctor or professional man, who often is obliged to start out with a minimum of delay.

In making cement mixtures for either foundations, floors or stucco work, it should be remembered that care should be taken to prevent the material from being exposed to freezing temperatures until it has set. Unless the builder was experienced in handling cement materials it would be better to delay the construction of the garage until a time when there would be no danger from frost. Cost of this type of garage should not exceed \$3500, including material and labor

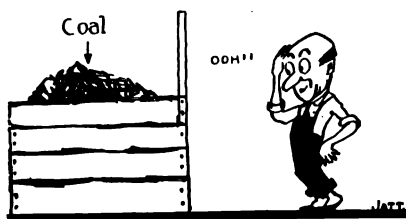




Riding in taxicabs is ordinarily a dear form of exhilaration and taking the "little dears" out in them is likewise a dear form of recreation, but it remained for an intrepid New Yorker to discover an even more expensive diversion with the aid of a taxi, which oddly happened to be the lesson that it was dear sport to shoot a deer from a taxi. The said nimrod was out taxying at an early hour in the morning when he spied a deer by the road. Pulling out a revolver he shot the animal. The circumstances of his lark was communicated to an officer of the law and he paid over \$100 and costs for his dear shot at the deer.

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Motorists have long recognized the old maxim to the effect that one good turn deserves another, and a man in trouble on the road has come to expect assistance from a passing car without feeling that he is obligated to compensate his



benefactor for the courtesy. This fact lead to much wonderment on the part of a garage keeper when he learned that his coal bin, which he had been unable to replenish, had been suddenly filled with a copious amount of the black diamonds and that the donator of the fuel was a man to whom he had extended aid while on the road some months previous.

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The average wheelbase length of all cars, as revealed in the Automobile Journal's latest specifications, is practically the same as it was last year, about 120 inches, with a slight tendency to longer wheelbases on the medium priced and high priced cars. Of the total models listed this year those of 112-inch wheelbase and over constitute over 86

per cent., while last year cars above 112 inch wheelbase and including that length made up about 84 per cent. of the total. The shortest wheelbase listed this year is 80 inches, which is the length of the Trumbull, while the longest is the Pierce-Arrow model 66-A-4, which is 147½ inches. This is probably the longest passenger car chassis manufactured. Last year the M. C. H. was listed with a wheelbase of 148 inches, but it does not appear in this year's list. Notwithstanding this showing on the whole this year there are more cars listed of 115-inch wheelbase than any other, the total being 16, as compared with 15 last year, while there are 15 cars listed in the 125-inch wheelbase class this year as compared with 12 last year. Last year there were 27 cars listed in the 127-inch wheelbase class as compared with only 13 this year. Then there were 19 cars of the 112-inch wheelbase class, while now there are only 13.

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The automobile seems to be coming into its own in Canada if statistics are any indication of popularity. In 1913 the car registrations in the Dominion increased by 16,780, nearly 38 per cent. over 1912; 1914 showed an increase of 36 per cent. over 1913; while at present Canada has more than 150,000 cars in operation. The population is approximately 7,500,000, and there is one automobile for every 50 persons. In Ontario alone there are about 75,000 cars and the whole of Canada stands third in the number of cars in actual use. It has 12 motor car companies in operation, with an output estimated at approximately \$50,000,000 a year.

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The indiscriminate spot light user will receive somewhat of a setback if the proposed legislation in Massachusetts goes through. A bill is now under consideration to prohibit the use of the spot light, which has been looked upon as somewhat of a menace to traffic, because of the few autoists who choose to flash this high powered light into the faces of approaching drivers.

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The first woman's automobile race, held at Los Angeles on Feb. 4 proved conclusively that though her sphere might be especially in the home, at manly amusements she is quite proficient. The one-mile run was made in 51 seconds, while the five-mile race finished in four minutes, 39 seconds. Women served as officials, as mechanics in the pits and as

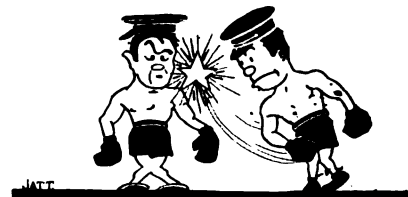
drivers. In fact, it might be termed an "All Women Race" in every respect.

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The New Jersey Automobile Trade Association, which has a strong membership in Essex county, New Jersey, has voted to conduct business on a strictly cash basis and will discontinue the practice of charging money due for repair services and accessories.

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The Massachusetts Automobile Operators' Association, in addition to promoting the interests of its members, holds social affairs occasionally at which the lively sport of boxing is the chief num-



ber on the program. The bouts are in the amateur class, but provide some lively sport, as the youngsters are fighting for a reputation and do not stall around the ring as the professional followers of the manly art are inclined to do.

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In line with the policy of leading manufacturers to aid the government in every way in the conservation of materials which are required for war purposes, the Republic Motor Corporation has announced to the trade that after Feb. 1 it will discontinue making a number of brands of mechanical rubber goods in which it believes there is an extravagant use of cotton duck.

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To show that they hold no competitive animosity toward each other, the coachmen and chauffeurs held a reunion on Jan. 28. The entertainment was furnished in the form of a dance, in which every male member was expected to do his share of the entertaining by "tripping the light fantastic toe." The general vote showed that the evening was an entire success.



In the 1916 specifications the highest priced four-cylinder car listed was the Ri-Chard, quoted at \$7500. This year it is the F. R. P., quoted at \$7000. Although the lowest priced car last year in the four-cylinder class was the Dunn at \$250, this year it is the Ford at \$360. In six-cylinder models last year the S. S. E. was the highest priced, selling at \$7000, while this year it is the Fageol, which is quoted at \$10,000. The Saxon was the lowest priced car in the six-cylinder class last year and still holds that distinction, the prices then and now being \$815 and \$935 respectively. The Ri-Chard is the highest priced eight-cylinder car this year at \$8000. Last year it was the Cunningham, selling at \$3750. The Ghent was the lowest priced eight last year, selling at \$1050, while this year the Hollier is lowest, selling at \$1285. The Austin 12 was the highest priced car in that class listed last year, selling at \$3750, while the Packard at \$4100 is the highest this year. The lowest priced 12 this year is the Kissel at \$2250, and the Enger, which is no longer manufactured, was the lowest last year, being priced at \$1295.

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"Nothing in this section shall be construed as in any way preventing, obstructing, impeding, embarrassing or in any other manner or form infringing upon the prerogative of any political chauffeur to run an automobile or band wagon at any rate he sees fit, compatible with the safety of the occupants thereof; provided, however, that not less than 10 nor more than 20 ropes be allowed at all times to trail behind this vehicle when in motion, in order to permit those who have been so fortunate as to escape with their political lives, an opportunity to be dragged to death; and provided further that whenever a man-



gled and bleeding political corpse implores for mercy the driver of the vehicle shall, in accordance with the provision of this bill, "throw out the life line." The above law was actually incorporated in a statute enacted in a western state.

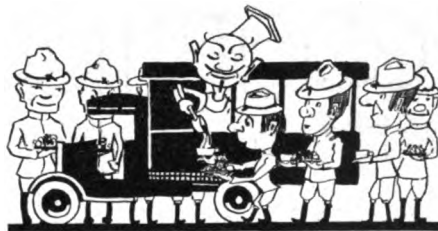
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It is not generally known in this country that in France a person who is run down by a vehicle on the streets is guilty of a crime. This peculiar process of the law was probably based on the fact that a pedestrian who kept on the sidewalk could not be run down by a vehicle and that when crossing a street he should be conscious of the danger and avoid it. Pedestrians in this country would, of course, look upon such a law as an usurpation of their constitutional rights, but if the number of motor fatalities continue to increase in the larger cities they may possibly witness

the enactment of statutes compelling them to wear lights and carry a horn as has been suggested in New York.

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Civil war veterans who when going to mess went long distances from their posts of duty and often waited many hours for their food and then took it cold would look with wonderment upon



the modern army kitchen establishment. These outfits, which are really steam hotel kitchens are mounted on trucks and in addition to being able to go to where the troops are on duty, have a capacity of serving 2000 soldiers at mess. This service can be rendered three times a day and within 10 minutes notice coffee for 1000 men can be prepared.

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A new type of ship to cope with submarines, described as being between a submarine chaser and a destroyer, has been evolved by Henry Ford, approved by the government and the plant at Detroit adapted to their manufacture. The prime object of the Ford ships, which are to be turned out on a quantity production basis according to Ford system, is to fill the gap between now and the time when the destroyer building program is completed. They will be ready and in action in a few months, whereas it will require nearly a year to complete a destroyer. They will have steam power and be able to carry heavier armament than the chasers now in use, including those of the 110 foot class.

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At any of our numerous army cantonments the visitor is quickly impressed with the large number of motorcycles fitting about the spacious camp, evidently performing errands requiring the greatest dispatch. The motorcycles in the country's various training camps are in great demand by officers whose presence is urgent in different parts of the cantonment within a short period of time.

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The men who have joined the training camps from Akron, O., the nation's chief rubber city, are stationed principally at Camp Sherman, in Ohio, and Camp Sheridan, in Alabama. The Good-year Friars organization is a troupe of amateur and ex-professional performers, all employees of company, whose efforts are chiefly in the direction of minstrels. They have just returned from a 1700-mile jump to Camp Sheridan, the longest known journey that any troupe has made for the purpose of entertaining the soldiers at any of our army training camps.

One of the high lights of the visit of the Friars was the magnificent reception

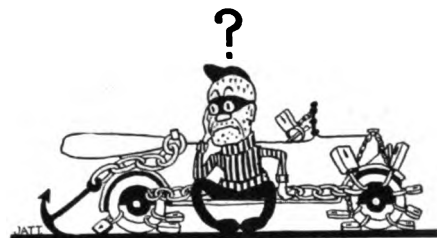
tendered them by Governor Charles Henderson, who received them in his executive office. The governor invited the "Yankees" to sing for him and soon the old historic walls of the former Confederate capitol building resounded with songs of the South. He showed a deep interest in the mission of the men and extended to them the hospitality of the city.

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Announcement that the Nantucket railroad, the only means of transportation on the island, was to be discontinued, recently caused a big panic among the inhabitants who saw an opening of the "We Walk" policy. The citizens of this little municipality in days of yore successfully legislated against the hated automobile, and since that time no benzine buggy has been allowed on the highways. The Legislature has been asked to repeal the law against the automobile. The committee which framed the bill announces that provision has been made for the use of machines in certain streets only and that automobile traffic will not be permitted in the section near the steamboat landing, the more thickly populated section.

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In Los Angeles during the past year over \$1,000,000 worth of motor cars were



stolen and in Detroit and Chicago motor thefts have increased at such an alarming pace that several insurance companies refuse to write theft risks on cars owned in those two cities. Numerous mechanical devices have been marketed to check the great traffic in stolen cars, but motorists seem to be pennywise and pound foolish as regards their cars, always "locking the door after the horse is stolen," to employ an expression that is quite appropriate, although involving a more ancient means of locomotion. Our artist has contributed his conception of a really theft proof car.

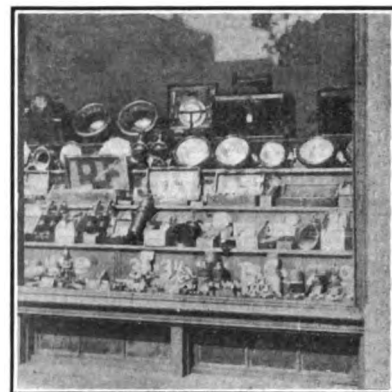
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Iowa now leads all other states of the Union in the number of automobiles owned per capita. On Jan. 15 there were 282,134 automobiles listed in the state, or one to every 8.4 persons, or one to every 1.7 families. The population of Iowa is estimated at the present time to be 2,385,000, or 477,000 families.





Accessories Department



PRESTO ENGINE HEATER.

Where an automobile is kept in an unheated garage the owner frequently experiences much trouble in starting the engine on a cold morning, due to the poor vaporization of the fuel. There is a consequent drain on the storage battery that soon damages that unit, or reduces its efficiency.

The Presto Engine Heater is designed to prevent engine trouble arising from low temperatures in unheated garages and may be used where lighting current is available. It consists of two electrical heating coils mounted in a perforated metal case, which is fitted on end with a swivel base hook and on the other with an insulated handle. This device is first connected, through the 10-foot length of flexible cord, with the lighting circuit, then placed beneath the hood of the automobile and the current turned on. But a few minutes are required to warm the carburetor to an operating temperature, and the strain on the storage battery is reduced.

It is claimed that the device uses but little current and may be left under the hood all night, in operation, ready for an early start in the morning.

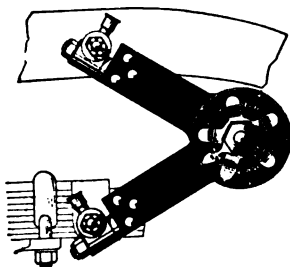
Manufactured by Metal Specialties Manufacturing Co., 338 N. Kedzie Ave., Chicago, Ill. Write for prices.

HARTFORD SHOCK ABSORBER.

Announcement is made to motorists and the trade of a new swivel type of shock absorber, made by manufacturers of the well known Hartford Shock Absorber. This device, while retaining the well known basic characteristics of previous models, shows a refinement of detail and the addition of an ingenious form of swivel, end joint construction.

The centre part, as usual, carries the friction discs of treated wood, held by loose pins, and encircled by a cover and adjusting device for increasing the friction as desired. The ends of the arms are each fitted with a steel stud, which is firmly riveted to the arm and over which is driven a split, steel spring bushing, oval in shape, which bears against the stud on two lines of its short axis.

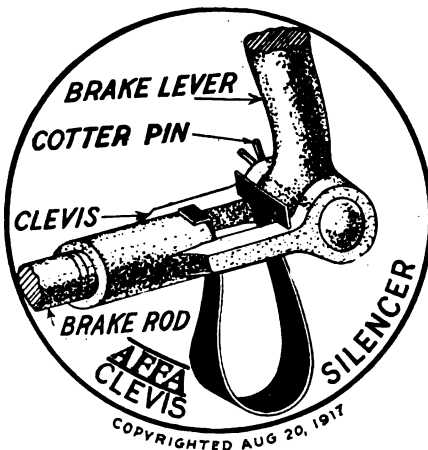
Over the stud and steel bushing a drop forged hardened knuckle is forced, the



Hartford Shock Absorber.



Presto Engine Heater.



smaller of the two holes in the knuckle is slightly smaller than the oval bushing at its largest diameter. This construction compresses the bushing, taking up the lost motion and compensates for wear.

The knuckle is held in position on the stud by a tightening nut, under which is a cupped spring washer that makes a tight, but movable connection. A hole at right angles to the stud hole fits over the chassis bolt, which is bushed and fitted in the same manner as the arm stud. A grease cup is fitted to each knuckle.

Manufactured by Edward V. Hartford, Inc., 147 Morgan St., Jersey City, N. J. Write for prices, stating name and model of car.

AFFA CLEVIS SILENCER.

Loose brake rods, etc., are responsible for many of the small rattles, squeaks and other noises that an automobile is heir to and cause a driver much annoyance. Besides this there is always the attendant danger of car damage due to neglect of other and more serious noises which are drowned out by a multitude of such small rattles.

The Affa Clevis Silencer, designed for the Ford car, but fitting clevises of many other cars, effectually silences the rattles arising from this source. This device is simple, as shown in the illustration, and easily applied.

Manufactured by Affa Specialty Co., 34 Southbridge St., Worcester, Mass.

NICRO SPECTER AND FLUX.

Much of the cost of repairing a broken water jacket is due to the fact that the machine must be dismantled, the part preheated and then welded. The actual welding operation is simple and effective. Something new in a brazing compound has just been put on the market, with which a broken casting, iron, bronze or brass may be repaired with but 300 degrees of heat; a temperature that can be had with an ordinary plumber's torch.

This new product is known as Nicro Spelter and is combined with a suitable flux, which enables the repair man to melt it into the broken jacket, etc., and so make a permanent repair.

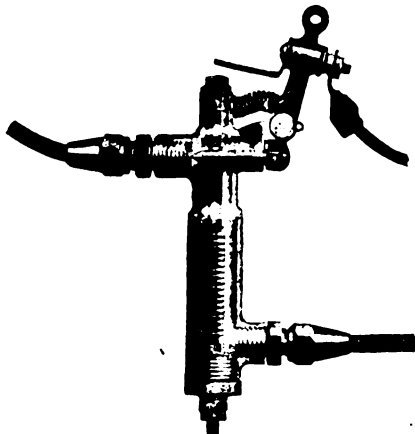
The spelter is silvery white when applied, but presents the appearance of bronze when filed, and is said to have an adhesive quality when used with the Micro liquid, that will cause a repaired jacket to be as good as new.

Manufactured by Peters Engineering Co., 3202 Chestnut St., Philadelphia, Pa. Write for price.

THE MASTER PRIMER.

Most starting difficulties that arise during the winter months are due to the cold gasoline which does not vaporize readily. To overcome this the Master Electrical Primer is now offered, which vaporizes the gasoline by heat.

This device is practically an auxiliary carburetor, but differs in that the gasoline is raised to the boiling point before it reaches the manifold. This hot gas is obtained through an electrically heated coil which rests in a porcelain lined chamber. The chamber is always filled



The Master Primer.

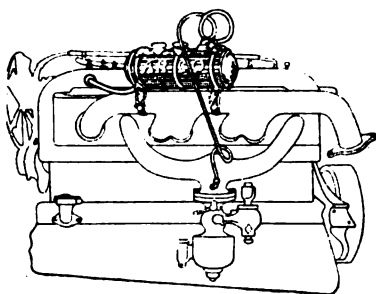
with gasoline, which is drawn direct from the carburetor at a point controlled by the float level.

A pull on the button, mounted on the dash, makes electrical contact with the battery and at the same time opens the outlet valve of the primer. The coil becomes white hot, boiling the gasoline, and the suction from the engine draws the hot vapor through the needle valve and mixes it with air to form a hot mixture. As soon as the engine is started the button is released and the battery current ceases to flow through the primer.

Manufactured by the Master Primer Co., 1523 Fort St. W., Detroit, Mich. Price \$12.50 complete.

ARCO CARBON ELIMINATOR.

Extensive experiments would seem to indicate that the introduction of water vapor in an internal combustion engine tends to reduce carbon, and, in many cases, aid combustion. The Arco Carbon Eliminator is designed on this principle and consists of a tank, mounted on the exhaust manifold, and lengths of suitable tubing. The tank is fitted with an automatic float mechanism and a strainer and is connected with the cylinder water jacket at any convenient point.



Arco Carbon Eliminator.

Leading from the top of the tank is a tube which carries the vaporized water to the intake manifold. In operation water runs through the strainer, where all impurities are taken from it, then into the tank. As the water level in the tank rises the float mechanism closes the valve, thus keeping the water at a predetermined level. The heat from the exhaust manifold or pipe vaporizes the water and this water vapor passes into the engine through the manifold.

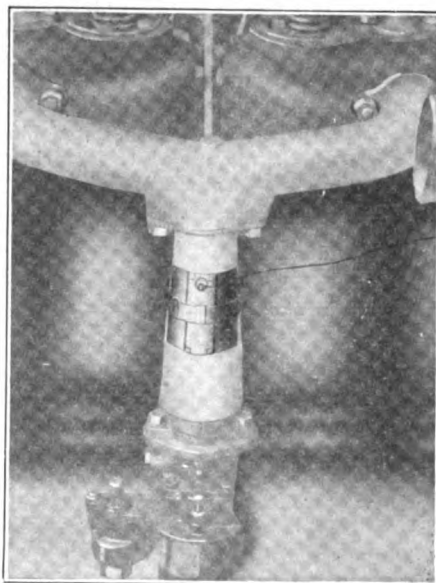
Manufactured by the Automatic Carbon Eliminator Co., 2010 Broadway, New York. Price, \$17, including installation.

ELECTRIC INTAKE HEATER.

Starting the engine is perhaps the biggest problem which troubles the motorist today. Even though the carburetor may function properly the gasoline vapor is condensed on a cold intake manifold so that but little or no fuel reaches the engine, until the crankshaft has been rotated a great number of times.

Now that many cars are fitted with storage batteries the current from this source may be used for heating high resistance coils of wire, which in turn heats the ingoing gas, and furnishes vapor to the engine.

Such a device is the Electric Intake Heater. It is designed to be clamped around the manifold at any convenient point and carries a coil of high resistance wire. A binding post on the device is connected through a dash switch with the storage battery or a set of dry cells.



Electric Intake Heater.

The other pole of the battery should be grounded.

When the heating switch is turned on current flows from the battery through the heating coil and heats a spot on the manifold. As the gasoline is drawn into the manifold it is immediately vaporized by the hot spot and the starting of the engine is said to be a simple matter.

Manufactured by Electric Intake Heater Co., Jackson, Mich. Price upon request.

LETT'S MANIFOLD HEATER.

Every car owner is on the lookout for a practical device that will not only lower his cost of traveling per mile, but will so vaporize the fuel that he will not have to worry about carbon formation and spark plug trouble.

Such a device, the manufacturers claim, is the Letts Manifold Heater. This heater is made in two parts, which are cup-shaped pieces of steel and clamp



around the intake manifold of the Ford car, for which it is designed, forming a hot air stove. Leading from the upper part of the stove is a short length of asbestos insulated flexible hose, which is fitted to a 3/4-inch iron pipe fitting, tapped into the exhaust manifold. Two bolts hold the device to the manifold.

As soon as the engine begins to fire a stream of heat from the exhaust passes into the heater and begins warming up the intake manifold, which it surrounds. In a few minutes the entire lower end of the manifold is hot and the ingoing gas is highly vaporized. The two-piece construction of the heater makes cleaning of the device an easy matter.

Manufactured by Hill-Smith Metal Goods Co., 88 Pearl St., Boston, Mass. Write for price and descriptive literature.

WESTINGHOUSE CIRCULARS.

The Westinghouse Electric and Manufacturing Co. of East Pittsburgh, Pa., have just published two new pamphlets which should be of interest to the trade. The first deals with Bakerlite Micarta-D Gears and Pinions, and contains much technical information relative to this product and their installation. The dis-

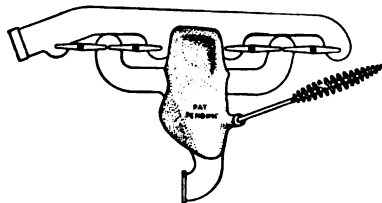
inctive features of Bakerlite material for noiseless gears and pinions, its physical properties, methods of turning, drilling and cutting and horsepower transmission are fully taken up in the book which should form a valuable addition to the library of any one interested in gear installation.

The second booklet is descriptive of starting motors, lighting generators and ignition units for automobiles, trucks, tractors, etc., and gives a general description of the Westinghouse starting motor for engines of piston displacement from 200 to 1000 cubic inches and of generators of capacities from 15 to 25 amperes at 6.5 to 13 volts.

Among the latter are included the new cam regulated generators which are being used on military and commercial trucks and farm tractors. Generators of this type are said to furnish constant voltage over a wide range of speed, even though the battery is disconnected from the circuit.

The book is profusely illustrated with views of the apparatus and its various parts and tables giving the necessary data for application are included.

Either or both of the above pamphlets may be obtained from the manufacturers or at any Westinghouse office.



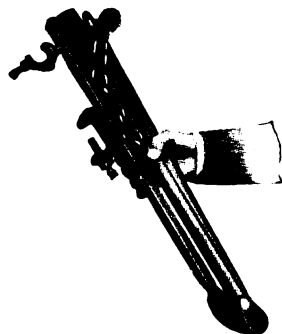
HOT-O-SPOT STARTER CO. CO. O.

HOT-O-SPOT STARTER.

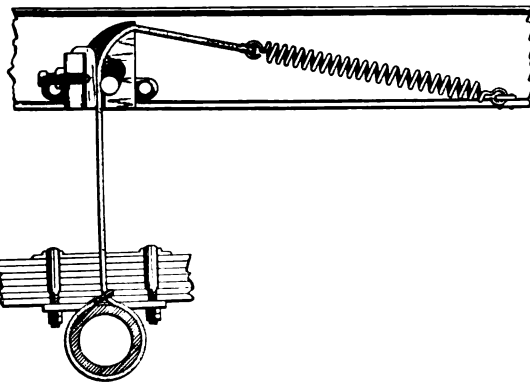
Hot-O-Spot Starter is an ingenious application of the hot-spot principle of vaporization. This device is an iron casting which is designed to fit over and conform with the shape of the intake manifold. It is fitted with a heat insulating wire handle.

To start a cold Ford engine the Hot-O-Spot is heated in an oven or over a fire and then hung on the intake manifold. After a few minutes the manifold heats and the engine starts very readily. The device may be left in place while the car is being run and conveys heat from the exhaust to the intake manifold.

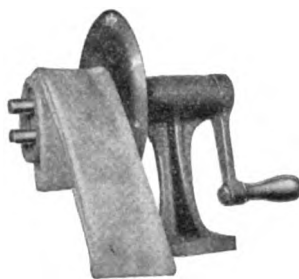
Manufactured by the Hot-O-Spot Starter Co., Columbus, O. Price, \$2.50.



Tozalone Tow Bar Folded



Common Sense Shock Absorber.



TUBE DEFLATOR.

A handy little device for use in repair shops and garages where much tire repairing or storing is done, is illustrated herewith. To deflate a tube by the old hand method takes both time and patience and few repair men or car owners care to go to this bother. With the device illustrated, however, the tube is slipped over one of the projections on the plate, then, by turning the handle, the tube is wound tightly around the two projections and the air is quickly exhausted.

Practically any size tube may be deflated with the device, which may be placed on the bench or wall in any convenient position.

Manufactured by the Williams Foundry and Machine Co., Akron, O. Write for price.

TOZALONE TOW BAR.

With an ordinary rope or chain towing a disabled car to the garage is a two-man job. With the Tozalone Tow Bar, however, one man is all that is necessary.

This device is so arranged that the rear car starts and stops simultaneously with the car in front, with no danger of collision. By the towing bar the rear car is automatically steered in the same path as the car in front.

The application is very simple. The clamp is fastened to the front axle of the disabled car, while the end of the bar is securely locked to the steering tie bar. The other end of the device is chained to the towing car. When not in use the device may be folded into an extremely small bundle and tucked into the tool box.

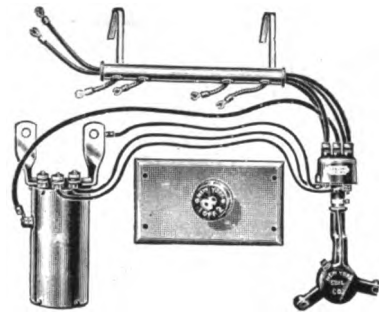
Manufactured by the Consolidated Motors Co., Detroit, Mich. Write for prices and descriptive literature.

COMMON SENSE SHOCK ABSORBER.

The Common Sense Shock Absorber is a new device which is especially designed to absorb and prevent the recoil of automobile springs. The shock absorber proper is securely bolted to the frame member and consists of a triangular wedging block and pin device, which is adjustable. Between the pin and the block a heavy strap passes, one end of which is passed around the axle, while the other is connected with a heavy coiled spring.

When the car passes over an obstruction in the road and the axle and chassis come together, the coil spring contracts and takes up the slack in the strap. The wedge and pin device permits the passing or slipping of the strap upward, but offers considerable resistance to its downward travel. The recoil is thus absorbed, both by the spring and by the wedging device, and it is said that the recoil is smooth and easy.

Manufactured by Common-Sense Manufacturing Co., Runyan St. and Sherman Ave., Newark, N. J. Write for prices.



VIBRATOR-LES COIL.

Something distinctively new in an ignition system for Ford cars is illustrated herewith, called the Vibrator-les Coil Ignition System. As every Ford owner knows, standard equipment furnished consists of four vibrator coils for ignition and a timer, and unless all of the coils are in perfect synchronism there is a certain loss of power in the engine.

The Vibrator-les system consists of a timer distributor unit, which is designed for mounting on the front of the engine, and driven from the present camshaft projection. The distributor unit is similar to the conventional high-tension distributor, while the timer, or breaker box is so arranged that with every break in the circuit a shower of sparks passes through the coil, which is mounted on the engine.

Current for the system is taken from the Ford magneto, and such is the construction of the breaker box that the "dead" points of generation in the magneto do not affect its working.

This system is said to work equally well either on dry cells or storage battery, and is furnished with a two-way switch, which may be mounted on the dash in place of the regular Ford coil box.

Manufactured by New York Coil Co., 338 Pearl St., New York, N. Y. Price complete, \$20.

Would Register All Car Operators in New York

Bill Proposed That Will Affect Over 400,000 Car Owners in That State.

A bill providing for the registration of all the motor car operators in New York state will be introduced in the Legislature at the instance of the New York Automobile Association. At the last meeting of the New York State Legislature a bill was passed compelling the registration of all motor car operators in New York City. An amendment to the headlight law of that state is also proposed, providing for tests by competent experts selected by the secretary of state to determine if the different devices and lenses now in use comply with the law.

PHILADELPHIA SHOW WAS VERY SUCCESSFUL.

While the attendance at the Philadelphia Automobile Show was not as great as on the previous year, the exhibition as a whole was very successful from most every point of view and exceeded in quality the shows formerly held.

There were nearly 60 exhibitors of cars and over a dozen accessory exhibitors and the show was laid out on a convenient plan with plenty of room for the individual exhibits, which were shown in attractive settings. The show was staged in the Wanamaker garage, three stories of which were donated free of charge by John Wanamaker as the Philadelphia Automobile Trade Association, under whose auspices the exhibition was held, were unable to find a suitable building for the show.

The following companies exhibited cars: Standard Motor Car Co., Abbott; Stewart Auto Co., Auburn; W. D. Sheperd, Allen; Biddle Motor Co., Biddle; Buick Motor Co., Buick; Automobile Sales Corporation, Cadillac; Herbert Bros., Chandler; L. S. Bowers Co., Cole and Grant; Chalmers Motor Car Co., and Grant; Chalmers Motor Car Co., Chalmers; Chevrolet Motor Co., Chevrolet; Oliver Co., Inc., Daniels; Thornton-Fuller Auto Co., Dodge; J. Harry Schumacker & Co., Dorris; J. C. Bartlett, Detroit-Electric; Fiat Motor Co., Fiat; Sweeten Auto Co., Franklin; Ford Motor Co., Ford; Gomery-Schwartz Motor Car Co., Hudson; Henry A. Rowan, Jr., Haynes; Hupmobile Sales Corporation, Hupmobile and Holmes; McCurdy Brainard Co., Jordan; Grieb & Thomas, Kissel and Briscoe; L. S. Bowers Co., Liberty; Locomobile Co. of America, Locomobile; Rogers-Lexington Motor Co., Lexington; Fanning-Mathis Co., Marmon; Rodney S. Pullen, Milburn Electric; Maxwell Motor Sales Co., Maxwell; Mitchell Motor Car Co. of New York, Mitchell; Samuel Earley Motor Co., Mercer; Bell Motor Co., McFarland; Murray Motor Sales Co., Murray; Monroe Motors Co., Mon-

roe; Samuels Earley Motor Co., National; Parker Motor Sales Co., King; Tioga Auto Co., Nelson; Hurley Motor Co., Nash; L. S. Bowers Co., Liberty; Larson-Oldsmobile Co., Oldsmobile; Oakland Motor Co., Oakland; Overland Motor Car Co., Overland; B. L. P. Motor Co., Premier; Packard Motor Car Co., Packard; Foss-Hughes Co., Pierce-Arrow; Girard Auto Co., Peerless; Bigelow-Wiley Motor Co., Paige; B. L. P. Motor Co., Reo; T. S. Johnston & Co., Scripps-Booth; Eastern Motor Corporation, Standard; S. R. Blockson Motor Co., Stutz; Saxon Motor Car Corporation, Saxon; Philadelphia Sales Corporation, Studebaker; Stanley Motor Carriage Co., Stanley; Stoever-Hannold Motor Co., Stearns; La Roche Bros., Velie; White Co., White; Winton Co., Winton.

The accessory exhibitors were as follows: Traveler Tire Rubber Co., Berroldin Rubber Co., Manufacturers Supplies Co., Gaul, Derr & Shearer Co., J. H. McCullough & Son, Cahall Motor Supply Co., J. G. Duncan, Jr., George W. Nock Co., J. Eavenson & Sons, A. Geissel & Sons, A. E. Jawer, Pierce Auto Supply Co., Supplee-Biddle Hardware Co., H. C. Roberts Electric Supply Co.



GUY E. TRIPP.

Chief of Production Division of Ordnance Department with Commission as Colonel.

WILLYS-OVERLAND DIVIDEND CUT TO FOUR PER CENT.

The Willys-Overland Co., Toledo, O., has declared a quarterly dividend of 25 cents a share, or at the rate of four per cent. per annum as compared with 12 per cent., the annual rate formerly maintained. The reduction of the dividend was explained by President John N. Willys, as representing the conservative policy adopted by the company owing to the change from a peace to war basis in the past year. Net earnings for 1917 were \$8,500,000 before deducting the excess profits tax, which it is asserted will not exceed \$600,000.

Aviation Corps Needs 7000 Mechanics

Will Be Sent to France as Soon as Possible—Salaries Range from \$30 to \$129.70.

The United States Public Service Reserve, a division of the Department of Labor at Washington, has issued an emergency call for 7000 additional motor mechanics for service with the Aviation Corps in France. The men must be of the ages 18 to 21 inclusive or 31-40 inclusive, and will be sent to France as soon as possible after they have enlisted in the service. Their work will cover various branches of the service, including repair of chassis, bodies, motorcycles, electrical apparatus and airplanes, and also general machine shop work.

The men will be formed into regiments of the following numbers and classes: 506 privates at \$30 to \$68.50 a month; 2024 privates first class at \$33 to \$72.10 a month; 2064 corporals at \$36 to \$75.70 a month; 1806 sergeants at \$44 to \$85.30 a month; 522 sergeants, first class, at \$53 to \$96.10 a month, and 82 master signal electricians at \$87 to \$129.70 a month.

SUPPOSING THERE WERE NO AUTOMOBILES.

Were all automobiles and motor driven vehicles ordered from the streets and from the country roads for a period of 30 days, what would happen to the business interests of America?

A prominent official of one of the national associations recently placed such a proposition before members of the trade, who marveled and pondered, and started from that time to study the automobile situation as it really is. Few of them had realized in the rush of their business the real necessity of the passenger car and motor truck to the business of the day, and the question brought home to them the fact that business throughout America without motor cars would be at a standstill, and although the readjustment was made to the old style of transportation, business of today would be an impossibility under former transportation methods by horse entirely.

C. S. Rieman, vice president and general manager of the Elgin Motor Car Corporation, feels that the motor driven vehicle is an indispensable necessity to America at all times, and at no time more than during the great war. America's manhood is engaged so largely in war and so many of America's young hustlers are engaged in war occupations that there must be an increase in efficiency in every field. The motor car is labor saving machinery in the estimation of Mr. Rieman, and is a time saver in every department of business. Automobiles in business are an economy and not an extravagance.

Discussion of The Heavy Fuel Problem

Description of Various Devices to Facilitate Starting, for Preventing the Formation of Carbon and Increasing Engine Efficiency

PERHAPS the greatest problem that confronts the car owner today is brought out in the form of carbon deposits in the engine. That the carbon evil is increasing is evidenced by the number of letters being received daily by the Automobile Journal requesting information as to ways and means for carbon prevention. The general opinion seems to point to lubrication as the basic cause of the evil. This is not, however, the primal cause. The real reason for the growth of the carbon evil can be traced directly to fuel.

Fuel having a high vaporizing point reaching the explosion chamber and improperly mixed with air quickly condenses on the walls of the cylinders, diluting the lubricant and allowing the lubricant to work into the explosion chamber. This excess oil, of course, carbonizes in the explosion chamber and that part of the carbon not driven off in the exhaust is deposited on the cylinder walls, in the rings, over the valves and in the chamber, thereby causing more oil leakage and consequent excess carbon formation. The poorly vaporized fuel in itself tends to carbonize with the same results.

Another factor which makes for oil leakage into the crank case is particularly applicable to old model cars, or engines two years old or more. This is the difference in engine design as regards compression. With the advent of low grade fuel manufacturers found it necessary to increase the combustion chambers and thereby decrease compression. They found that under the high compression used in cars two or more years old the wet mixtures of low grade fuel caused compression knocks, and so began to lower the compression of the new engines. In addition to the knock in the engines under high compression, it was found that the unvaporized fuel was forced past the pistons by the high compression, giving the same results as spoken of in the preceding paragraph.

Solution of the Problem.

The obvious solution of the whole problem is to vaporize the fuel, bringing the matter down to the basic principles of carburetion. When the carbureting principle has been mastered fully, then the carbon evil will disappear entirely or be so reduced as to be negligible.

It would seem that proper carburetion might be obtained by proper application of heat to the fuel, either before or after it is mixed with air, since the only difference between the present day fuel and that of the past, as far as carburetion is concerned, is that the vaporizing point is higher today than in the past.

As heat is applied to the gas mixture,

however, a certain amount of expansion commences, increasing the volume of gas and reducing the volumetric efficiency of the engine. The temperature of the gas is therefore an important point to be considered when heating the mixture so that carburetor designers are working two ways, by the addition of heat to secure vaporization and by the elimination of heat to secure more volumetric efficiency. Working thus, with directly opposed methods, they have a seemingly impossible task.

Kerosene Carburetor a Triumph.

As an instance of the resourcefulness of engineers in accomplishing both ends and performing the seemingly impossible task, the kerosene carburetor is designed to mix a small quantity of fuel and air at a high temperature, thus securing a dry vapor, properly carbureted. This small volume of gas is then mixed with the balance of the air and immediately drawn into the cylinders before it has had time to fully expand. The results are said to be extremely satisfactory, and the manufacturers claim that kerosene may be used, giving as much, if not more power than gasoline after the engine has been heated.

The general tendency of carburetor design is to ignore the gas expansion factor as negligible and work for proper vaporization by the addition of heat, either to the carburetor or manifold. There are a great number of such devices on the market, so that space will not permit a description of each. Only a few of the different types will be taken into consideration, typical and representative of the devices in question.

Hot air stoves or pipes attached to the engine manifold and connected with the carburetor air intake are quite common and are usually put out as car equipment.

Utilizing the Battery.

Now that so many of the automobiles are equipped with storage batteries, a favorite form of heating device is designed to take the current from the battery and turn it into heat, either in the carburetor or manifold.

To break up the mixture more thoroughly after it has left the carburetor there are a number of heating devices on the market which are designed for manifold attachment, near the carburetor and connected with the battery. When the current is turned on a coil of wire is heated which transfers the heat to the passing gas.

Designers, working on devices for vaporizing kerosene for engine fuel have worked out many types of combination manifolds, utilizing the heat of the exhaust to warm the incoming gas. Of these there is the hot pin manifold, the

intake passage of which is studded with numerous pins, which are claimed to transmit a maximum amount of heat to the passing gas and form a dry mixture.

Other types of manifolds consist of interwoven exhaust and intake passages, designed to remove the heat from the exhaust gas and utilize it for heating the incoming vapor, the passages being made to overlap as far as possible without forming too many bends in the intake, thereby reducing the intake gas velocity.

Though the proper heating of fuel and mixtures has been the study of carburetor and engine manufacturers for some time, there is another subject which has attracted the attention of engineers, that of water vapor in combination with the explosive charge.

Exhaustive experiments have shown that when properly mixed with the charge water has a tendency to crack off the carbon in flakes and so loosen it that it is blown through the exhaust. There is another theory that water vapor disintegrates or returns to its original elements of oxygen and hydrogen under the action of extreme heat which is found in the explosion chamber, forming explosive gas which adds to the engine power. This may explain the reason why an engine seems to run better on a foggy or damp day than in dry weather.

Two Types of Moisture Devices.

Water vapor or moisture devices may be divided into two classes, those taking the water from the radiator, and those which are designed with an auxiliary tank. In practically every case the tendency is to provide a finely divided vapor or steam, for experience has shown that a dry steam has more effect upon carbon than simply drops of water. In a device of the first type water is taken from the upper part of the radiator and passed into the special manifold device which replaces the exhaust manifold. In this the water is heated to a dry steam and the vapor passes into the intake manifold. Another device consists of a water tube running into and through the exhaust manifold, and connected with the intake manifold. Water is taken from the radiating system and admitted through a diaphragm controlled valve, thus controlling the amount of water going into the engine.

Many car owners have methods of their own to remove carbon, some of them preferring certain liquid carbon removers, others using kerosene with alternate applications of water. For this class the second type of auxiliary tank water vaporizers are made. When an auxiliary tank is used any liquid may be placed in it as desired by the operator.

Close Cooperation For Control of Oil Industry

Fuel Administrator Will Work With Industry in Supplying War and Domestic Needs.

Dr. H. A. Garfield, United States Fuel Administrator, and M. L. Requa, the recently appointed head of the oil division of the fuel administration, following a meeting of the petroleum war service committee, stated it was the desire of the fuel administration that the men representing the petroleum industry should cooperate fully with and give to the fuel administration the benefit of their knowledge to the end that whatever control is to be exercised shall be only after full knowledge of all phases of the problem shall be obtained by an intelligent and constructive study.

It was also indicated following the meeting that it was not the intention of the fuel administration to take up at present the question of price fixing, but that a general survey of the whole industry would be made in cooperation with the various branches thereof, with a view to determining what action the government might take to assist in supplying more effectively the necessary fuel for war purposes and to provide and arrange for the supplies of fuel oil required for the various industries at home.

Mr. Requa stated that it was his desire that the petroleum war service committee should for the present continue its activities without change, to the end that there should not be any interruption in the continuous flow of petroleum products to the Allies or for our domestic uses.

FREE MOTOR COURSE AT COOPER UNION SCHOOL.

Cooper Union, the well known trade school in New York City, has added a motor vehicle engineering course to its night courses. It is designed for the benefit of men working in motor car shops during the day and will enable them to learn the technical and theoretical side of the business in a thorough manner.

INVENTOR WINS SUIT AGAINST BOSCH COMPANY.

Samuel M. Rushmore of Plainfield, N. J., obtained a judgment in the United States court against the Bosch Magneto Co. for \$100,000. He sued on a claim of breach of contract the magneto company having taken over its automobile starter patent on a three-year contract, agreeing to advertise the device as the "Rushmore" or "Bosch-Rushmore" starter, and they were to pay him \$100,000 in the

event of their failure to live up to these conditions. Rushmore contended in his suit that the defendant improperly licensed other concerns to use his patent and that in three years his name was mentioned only 19 times in advertisements.

J. F. GUIDER WILL HAVE CHARGE OF CADILLAC PLANT.

John F. Guider, who has been an executive with the Pierce-Arrow Motor Car Co. for the past 12 years, has been elected vice president of the Cadillac Motor Car Co. in charge of manufacturing.

Mr. Guider, who was factory superintendent with the Pierce-Arrow company, is a New Englander by birth. He started work when only 11 years of age and served his apprenticeship as a tool maker with the Yale Lock Co., now the Yale & Towne Manufacturing Co. of Stamford, Conn. Later he worked at building, installing and testing marine engines. He also worked for the American Graphophone Co. at Bridgeport, Conn., and as a mechanical expert in a New York patent office. He also did research work for the Union Typewriter Co.

In 1905 he went to the Pierce-Arrow factory and was made superintendent two years later. He resigned late in the year and assumed charge of the production of Cadillac cars in Detroit on Jan. 1.

LOUISVILLE, KY., HAS SURPLUS OF POWER.

The Louisville Industrial Foundation, Louisville, Ky., which promotes the manufacturing interests of that city, has sent out an announcement stating that the Louisville central station has more than 10,000 K. W. surplus electric power for industrial purposes. This condition, the circular states, is due to the fact that the central station owns the mine from which it draws its coal supply and owns its coal cars. Its coal mine is just a night's run from Louisville, assuring a plentiful supply of fuel and continuity of electric power. It also states that Louisville can supply a considerable area of floor space for manufacturing purposes.

PAN-AMERICAN MOTORS CORP. HAS NEW HEAD.

The Pan-American Motors Corporation, Chicago, Ill., has elected Edward Denner as its president to succeed Arthur H. Wyatt, and with the change the control of management also passed. The new interests have decided to locate the main offices and plant at Decatur, Ill., and will only have a salesroom in Chicago.

FORD TAKES OVER THE HOLLEY CARBURETOR CO.

The Ford Motor Co., Detroit, Mich., has taken over the carburetor department of the Holley Brothers Co.

N. A. D. A. Memberships Are Open To All Dealers

Fred W. A. Vesper of St. Louis, Elected President, Will Start Membership Campaign.

The National Automobile Dealers' Association, formed last summer, and which has 575 dealer members, represented through the association members of the organization, has voted to admit dealers as members who are not affiliated with local associations. This decision was arrived at during the meeting of the association held in Chicago during show week and the bylaws were amended accordingly.

Fred W. A. Vesper of the Vesper-Buick Co., St. Louis, Mo., who was formerly a vice president of the association, was elected president. The officers are: Vice presidents, John A. MacAlman, Boston; Prince Wells, Louisville; treasurer, Thomas J. Hay, Chicago; directors, George W. Browne, Milwaukee; John H. Johnson, Boston; George D. McCutcheon, Atlanta; P. E. Chamberlin, Denver; P. H. Greer, Los Angeles; A. E. Maltby, Philadelphia; J. A. Graham, Minneapolis; C. A. Forester, Cleveland, O., and Dean Schooler of Des Moines.

It was voted to conduct a strong membership campaign and an educational propaganda among the trade for furthering trade and public interests. This work will also include the promotion of good roads. The present membership is from 15 states and is represented through local organizations as follows: Kansas City, 64; Los Angeles, 58; Chicago, 76; Boston, 44; St. Louis, 43; Milwaukee, 42; Minneapolis, 33; Des Moines, 30; Cleveland, 34; Dallas, 25; Albany, 17; Atlanta, 13; Worcester, Mass., 18; Louisville, 15; Oklahoma City, 20; Denver, 31; Davenport, 12. There are also a number of Philadelphia dealers listed as members. The membership fee is \$10.

The association has received \$5940 in dues since it was organized and has a surplus in the treasury of \$2642.

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, spoke to the dealers on the value of organization.

BIJUR MOTOR LIGHTING IN RECEIVER'S HANDS.

The Bijur Motor Lighting Co. of New York has been placed in the hands of receivers following a suit brought by the Cleveland Automatic Machine Co. of Cleveland. E. Bright Wilson, Joseph Bijur and Louis V. Hubbard are the receivers.

The company has outstanding capital stock of \$1,625,000, of which \$1,000,000 is common and the rest seven per cent. preferred.

Annual Statements Reveal Prosperous Year

Motor Car, Engine and Rubber Companies Report Increase in Sales and Net Profits.

The Continental Motors Corporation, which took over the Continental Motors Co. on Jan. 24, 1917, has issued a report covering its operations from that date to Oct. 31, 1917, the end of the fiscal year, which shows an increase in sales of 32 per cent. as compared with the old company's statement of 1916. Unfilled orders on the company's books as of Oct. 31 last were \$17,000,000. The financial statement of the corporation is as follows:

INCOME ACCOUNT.

Profits	\$2,052,068
Interest	25,106
Depreciation	390,147
Reserve for federal tax.....	240,000
Net income.....	1,396,814
Preferred dividend.....	178,305
Common dividend.....	217,928
Surplus	1,000,579

BALANCE SHEET.

ASSETS.

Land, plants, etc.....	\$7,201,807
Liberty bonds	57,548
Other investments	6,756
Materials	5,068,955
Accounts receivable	1,370,543
Cash	369,420
Prepaid taxes, insurance, interest	42,879
Total.....	\$14,117,911

LIABILITIES.

Preferred stock	\$3,500,000
Common stock	7,220,069
Accounts payable	1,880,179
Accrued pay rolls, taxes, interest	517,083
Surplus	1,000,579
Total.....	\$14,117,911

The Kelly-Springfield Tire Co. during the year just closed made net profits of \$2,700,000 on gross sales of about \$14,000,000. After deducting the war tax of approximately \$600,000 and allowing for \$210,000 dividend requirements on the preferred stock, a total of \$1,900,000 for common dividends and surplus remains. Over \$1,000,000 has been added to the company's surplus, bringing it up to \$6,000,000. The daily production at the company's three plants in Akron, O., Cumberland, Md., and Buffalo, N. Y., increased nearly 50 per cent. during the year, averaging 2200 pneumatic tires a day now as compared with 1400 daily at this time last year.



Frank M. Eldredge, Advertising and Publicity Manager of L. V. Fletcher & Co., New York.

The L. V. Fletcher & Co., New York City, has opened a branch office at Detroit with George K. Parsons in charge. Frank M. Eldredge, formerly of the Wallace C. Hood Service Bureau, is advertising and publicity manager. The company manufactures carburetors.

The Simplex Rubber Co. is now located in its new plant at Batavia, N. Y. Branches will be opened in most of the largest cities.

The Bell Motor Car Co. has purchased the buildings formerly occupied by the Pullman Motor Car Co. James Adair is president and Dr. B. Frank Posey is secretary and treasurer.

The General Motors Corporation during the five months ended Dec. 31, 1917, made net sales of \$94,500,000, against \$60,731,130 the like period of 1916, and the undivided profits were \$15,000,000, equal to 15½ per cent. on the common stock, against \$11,238,984, the equivalent of 12.15 per cent. on the common shares. The cars and trucks sold in the five months' period in 1917 numbered 86,901, against 65,893 in 1916. The cash in banks and in sight drafts, with documents attached, as of Dec. 31 last, amounted to approximately \$24,275,000.

The Mason Tire and Rubber Co., Kent, O., for the first quarter of 1918 report a sales increase of 700 per cent. over the same quarter of 1917. The sales for the month of January were the largest in the history of the company for any one month. The company is employing at present a large force of men at work installing the new calendars and when erected and in operation will give the plant a daily production of 1500 tires.

A. G. Dale is now associated with the King Motor Car Co. as district sales manager. He was formerly with the Premier Motor Corporation.



Benjamin Gotfredson, New President of the Saxon Motor Car Corporation of Detroit.

The Tidewater Oil Co. has established a Veedol department under the management of H. J. Guthrie, 11 Broadway, New York, to distribute its products. Mr. Guthrie was formerly president of the Platt & Washburn Refining Co., now dissolved, which has been owned by the Tidewater Oil Co. for 29 years, although conducted as a separate company, and which has hitherto carried on the business of selling these products. The Tidewater Oil Co. manufactures Veedol oils and greases, Tydol gasoline and other specially refined petroleum products.

The Stewart-Warner Speedometer Corporation, Chicago, Ill., announces that the company profits for the year ended Dec. 31 are expected to be placed in the annual report at \$2,200,744, these being net before deducting income and excess profits taxes. For the calendar year 1916 net profits totaled \$2,215,043.



H. J. Guthrie, Manager of the Veedol Department, Established by the Tidewater Oil Co.

Personal News of Motor Industry in Brief



H. B. Harper Leaves General Sales Organization and Becomes Overland Distributor in Philadelphia.

H. B. Harper, general sales manager of the Willys-Overland Co., Toledo, O., has severed his connections with the factory to become Philadelphia distributor of Overland cars.

B. G. Koether, manager of the Hyatt Roller Bearing Co., Detroit, announces an addition to their staff of sales engineers of C. E. MacConnell. He was formerly with the Detroit branch of the Goodrich Rubber Co. as advertising manager.

A. A. Lightfoot has been appointed division manager at Chicago of the Marathon Tire and Rubber Co., Cuyahoga Falls, O. He was formerly the representative at Pennsylvania and succeeds H. F. Smith, who has resigned.

S. D. Levings has resigned as eastern representatives of the Automobile Equipment Department of the Westinghouse Electric and Manufacturing Co.

R. E. Benner has been appointed factory manager of the Franklin Automobile Co., Syracuse, N. Y. At one time he was with the Maxwell company as a car designer and afterward with the Buick company.

The Forge Products Corporation, Ann Arbor, Mich., has been incorporated with a capitalization of \$350,000 to manufacture high speed steel forgings for tool work and motor car parts. All the necessary machinery has been purchased and will be ready for installation upon completion of the first new building.

The Hartford Auto Parts Co., Hartford, Conn., have re-elected the following officers: President, C. C. Chamberlain; vice president, J. M. Carney; treasurer, J. H. Trumbull; secretary, H. Trumbull; assistant treasurer, H. W. Biglow. The directors consist of the officers with H. H. Ensworth, president of L. L. Ensworth & Sons Co.; H. A. Allen, vice president City Bank and Trust Co., and May J. Unkolbach.

Well Known Automobile Men Take Up New Duties—O. C. Friend With United Motors

H. S. Bentley has been promoted to the position of manager of sales promotion by the Willard Storage Battery Co., Cleveland, O. The company has appointed A. C. Hyser head of the Willard service system. A. E. Wilson, formerly Willard manager in Rochester, N. Y., has been made district sales manager in New York City. J. J. Henderson succeeds him at Rochester.

Clark W. Parker has resigned as president of the Parker Rust Proof Co. of America and is succeeded by George Lane, who has been manager of the company. Mr. Parker still retains a financial interest and is a director.



Otis C. Friend Resigns from Mitchell Motors to Take Vice Presidency of the United Motors Corporation.

Otis C. Friend, who was under contract with the United States Motors Corporation and who was virtually loaned by it to the Mitchell Motors Co. to fill its presidency, has returned to the Big Parts Co. as vice president. Mr. Friend's ability and experience will be of the greatest value in the counsels of the Big company.

The Akron Tire Co., Honeywell street and Skillman avenue, Long Island City, N. Y., has had plans prepared for the construction of a one-story 50 by 95 foot factory to cost approximately \$12,000.

The Chalmers Motor Corporation, Detroit, Mich., at its annual meeting voted to reduce the authorized common stock from 532,000 shares of no par value to 400,000. The 132,000 shares involved consisted of authorized stock in the treasury which had been unissued. The fiscal year of the corporation has been changed from the calendar year to the year ending July 31. The following

board of directors was elected: Jules S. Bache, J. Horace Harding, Hugh Chalmers, Henry E. Butler, George C. Van Tuyl, Jr., Joseph H. Clark and W. P. Kiser.

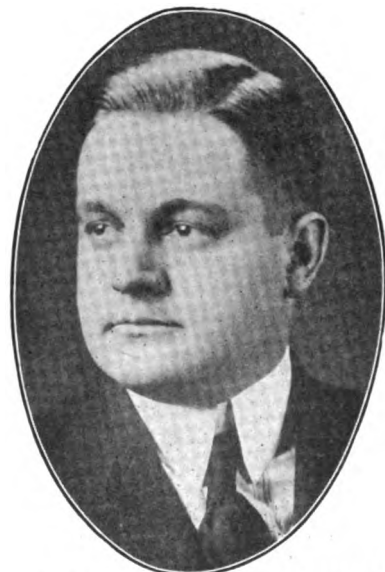
Waddill Catchings of Goldman, Sachs & Co., New York, has been elected a director of the Studebaker Corporation. He takes the place of Henry Goldman on the executive committee, who has retired from active business. Mr. Goldman will remain a director of the company.

Allen G. Chambers has become associated with the Russel Motor Axle Co., North Detroit, Mich., in the capacity of assistant sales manager, undertaking sales promotion and active selling of internal gear driven truck axles and supervision of advertising.

The National Wire Wheels Works, Inc., Geneva, N. Y., has increased its capitalization to \$1,000,000 from \$350,000. Recent additions to the company's business of considerable importance are contracts for furnishing its wire wheels as standard equipment of Maxwell sedans for 1918 and large quantities of airplane wheels for the government.

The Empire Tire and Rubber Co., Trenton, N. J., is expanding its plant and will double its capacity.

The McLean Tire and Rubber Co., East Liverpool, O., has completed an addition to its factory. The new building will be used as a mill and stock room and is 80 by 150 feet. The company is devoting itself exclusively to the production of its "Champion" non-skid tire. It will increase the output of tires from 300 a day to 500 after the first year.



Allen G. Chambers, Assistant Sales Manager and Supervisor of Advertising, Russel Motor Axle Co

Additional News of the Motor Industry

The Automobile Equipment Department of the Westinghouse Electric and Manufacturing Co. will remove their manufacturing operations to the company's Newark works, Plane and Orange streets, Newark, N. J., about Feb. 15. The company has for many years been manufacturing small motors and instruments of accuracy and precision. The general sales offices will be moved to 110 West 42nd street, New York City, where the eastern district sales offices will also be located.

The J. I. Case T. M. Co., Racine, Wis., has appointed five new branch house managers and are as follows: J. H. Keegan has been promoted to the managership of the Des Moines, Ia., branch, which is one of the largest of the entire Case organization. C. B. Shaw succeeds him at Chicago. C. E. Kiser has been appointed manager of the branch in Amarillo, Tex., where he has been assistant. W. H. Burgess, who has been assistant manager in Nashville, Tenn., has been appointed manager in Indianapolis, Ind.; C. T. Bishop is in charge in Denver, Col.

The Leach Motor Car Co., Los Angeles, Cal., has taken over the sales room formerly occupied by the Pathfinder on Olive street. The company is the distributor for the King 8, Premier, Dort and Liberty. This now gives the concern three different stores in Los Angeles.

The King Motor Car Co., Detroit, Mich., has appointed the following as distributors for the King cars: W. C. Miser, Ashland, Wis., and Fritton & Wolken, Leigh, Neb.

The Columbus Varnish Co., Columbus, O., voted to increase its capital stock at the annual meeting of the directors to \$400,000. The company not only makes varnishes for all purposes, but are the sole makers of the Peerless line of automobile specialties.

The National Motor Car and Vehicle Corporation, Indianapolis, Ind., have announced that in order to meet the increased cost of raw materials, parts and labor, the prices of all six and 12-cylinder models in the 1918 line have been increased. The new prices, which go into effect immediately, represent an increase of \$155 in the cost of the seven-passenger touring car, four-passenger roadster and four-passenger phaeton, the revised prices being \$2150 and \$2750 for the six and the 12 compared to \$1995 and \$2595 at which they were formerly listed. The price of the new two-passenger dispatch roadster has been increased \$100. The six-cylinder sedan remains at \$2820, while the same body of the summer-winter convertible type, mounted on the 12-cylinder chassis, sells for \$3420.

The B. F. Goodrich Co., Akron, O., has declared its usual quarterly dividend of one per cent. on the common stock, pay-

able May 15, and regular quarterly dividends on the preferred stock, payable April 1 and July 1. During the year ending Dec. 31, 1917, the company made net profits of \$12,675,000 after providing for maintenance charges, depreciation and bad accounts.

W. S. Emerson, architect, Ardmore, Okla., is preparing plans for the construction of a 100 by 300 feet factory building for the Ardmore Akron Tire and Rubber Co. The new building will cost \$60,000.

The Zee Zee Rubber Manufacturing Co., Yardville, N. J., has started work on a new plant to cost \$500,000, which will be used for manufacturing automobile tires.

S. S. Toback, for many years a dealer in New York City, has entered into the ranks of the manufacturers as general manager of the Redden Motor Truck Co., Detroit, Mich. He is a founder member of the Automobile Club of America.



S. S. Toback Leaves Dealers' Ranks, Becoming General Manager of the Redden Motor Truck Co., Detroit.

The Chandler Motor Car Co., Cleveland, O., during 1917 produced about 15,000 cars and sent shipments to 36 different foreign countries. The company's earnings were equal to about 34 per cent. on the \$7,000,000 outstanding stock, not allowing for federal taxes.

The Chevrolet Motor Co. during 1917 made total gross sales of \$62,638,303, as compared with \$32,306,295 in 1916. The company sold 125,000 cars last year, against 69,522 the year before.

The Hyatt Roller Bearing Co. has conveyed to the United Motors Corporation its plant at Harrison, N. J., consisting of six buildings.

A. E. Vinton has been appointed advertising manager of the National Motor Car and Vehicle Corporation, Indianapolis, Ind. Mr. Vinton has been in the sales department for eight years, where he has been in charge of the export trade, which position he still retains.

The Dorris Motor Car Co., St. Louis, Mo., has acquired the plant of the Mogul Motor Truck Co., which adjoins the Dorris plant.

Traded Old Ford for Oil Lease Worth \$300,000

Deering J. Marshall, Oil Operator, Elected Vice President of the Jones Motor Car Co.

Deering J. Marshall, an oil operator, who three years ago traded a second-hand Ford, valued at \$80 for an oil and gas lease, which he afterwards sold for nearly \$300,000, has been elected vice president and a director of the Jones Motor Car Co. of Wichita, Kan., makers of the Jones line of cars and trucks.

Mr. Marshall did not rest upon his oars after his stroke of luck, but built his fortune up to the \$2,000,000 mark, it is reported.

John Engstrom, a well known lumberman of Wichita, has also been elected a director of the Jones company.

The Prest-O-Lite Co., Inc., has appointed the following firms as distributors of acetylene products: Bellows Battery Service, 846 S. Grand St., Los Angeles, Cal.; Kramer Auto Electric Co., 1043 S. Olive St., Los Angeles, Cal.; Pioneer Garage, Newman, Cal.; Santa Rosa Battery and Electric Co., corner Third and Main Sts., Santa Rosa, Cal.; Bollhorst Bros.' Garage, 207 E. Second St., Beardstown, Ill.; Owens Auto Repair Shop, 100 W. Coolbaregh, Red Oak, Ia.; J. J. Anderson & Son, Garnett, Kan.; Youngstown Storage Battery Co., Holmes and Commerce Sts., Youngstown, O.; Vaught Tire Service, James and Foreland Sts., Pittsburgh, Pa.; The Hartnett Salley Co., 71 E. Russell St., Orangeburg, S. C.; Southern Garage, Denison, Tex.; Norfolk Battery and Service Corporation, Brooke Ave. and Boush St., Norfolk, Va.

The Pullman Motor Car Co., York, Pa., has filed a report with Judge Charles B. Witmer of the United States District Court at Scranton. Unless exceptions are taken to the accounts of the receivers within 30 days the report will be finally confirmed at the March session of the district court. The receiver's report shows a balance of \$37,898.36 for distribution among creditors.

The Goodyear Tire and Rubber Co., Akron, O., has made changes in its branch managers and are as follows: P. A. Kerns, formerly manager at Butte, Mont., has been made manager at Buffalo, N. Y.; W. J. Peete, who has been handling government business at Washington, will succeed Mr. Kerns at Butte; F. L. Morgan has been promoted from assistant manager at Philadelphia to manager of the Cleveland branch, succeeding F. N. Hammond; R. J. Davies, formerly city salesman at Jacksonville, Fla., has been appointed manager of the Nashville, Tenn., branch, succeeding E. H. Morris, who has entered government service.

AUTOMOBILE PARTS LOW IN SUSPENSION LISTS.

Before the government closed down all the factories of the East to save fuel over the period of five days from Jan. 18 to Jan. 22, it had required of the paper and box board manufacturers to adopt a five-day working week, by closing their factories from Friday nights until Monday mornings. Before the government took either of these economic steps it had authentic surveys in hand for the accurate judging of labor conditions in manufacturing centres. These gave the first disclosure of the actual industrial condition of the country by showing exactly what industries were laying off workers.

From the great outcry raised at Washington early in the war against the "pleasure automobile," expectation would confidently be that automobile parts should stand high on the list. But as a matter of fact the only one appearing is way down at the tail end. The industries making the largest reductions in the labor forces in New York City and state were reported on by Miss Marie L. Obenauer, head of the women's war work section of the United States employment service, and Miss Obenauer arranges the principal industries in the state which are laying off workers, though engaged directly or indirectly in filling war orders, in the following order:

1. Garment trades, especially custom-made suits, coats and high-grade skirts.
2. Carpets.
3. Fine leather.
4. Fine kid gloves.
5. Trunks, suit cases, etc.
6. High-grade woodwork.
7. Wagons and parts.
8. Mattresses and spring beds.
9. Typewriters.
10. Brass and bronze castings and art metal work.
11. Tin cans.
12. Differentials for pleasure automobiles.
13. Machinery (paper box, wood-working, sewing machines, etc.).

INDUSTRIAL ALLIANCES EXPEDITE WAR WORK.

Alliances in the automobile industry are expediting war work. In one such alliance in Lansing, Mich., 18 firms have organized as the Lansing Allied Industries to handle government war work. A central office is maintained in Washington and government contracts will be passed from factory to factory until completed. These are the concerns in the organization: Gier Pressed Steel Co., Prudden & Co., Novo Engine Co., Auto Body Co., New Way Motor Co., Dail Steel Products Co., Reo Motor Car Co., Michigan Screw Co., Lansing Stamping and Tool Co., Hugh Lyons & Co., Lansing Foundry Co., Eureka Machine Co., Reliance Engineering Co., Lansing Co., Ideal Engine Co., Olds Motor Works, Duplex Truck Co. and the Lansing Forge Co.

STUTZ REPORTS BIG SALES AND FACTORY EXPANSION.

The Stutz Motor Car Co of America, Inc., for the year ending Dec. 31 reports an increase in sales of 43 per cent. and an increase in profits of 65 per cent. The income account for the year is as follows: Net sales, \$4,483,315; cost of manufacture (including depreciation of equipment), \$3,375,980; gross profit, \$1,107,335; selling, administrative and general expenses, \$77,638; balance, \$1,029,697; interest and discount earned, \$45,081; net profit, \$1,074,778. Profit and loss account of same date was as follows: Balance on Jan. 2, 1917, \$2,439,022; net profits, \$1,074,778; total, \$3,513,800; dividends paid Jan. 2, 1917, included in last year's statement, \$281,250; donated to National Guard of Indiana, \$10,125; total, \$291,375; profit and loss surplus, \$3,222,425.

H. C. Stutz, president of the company, in his address to stockholders, stated that the year just closed had been the most prosperous in the history of the company and submitted the following table, showing the growth of the business since 1913:

Year	Output	Net Profit
1913.....	759	\$292,000
1914.....	649	151,100
1915.....	1079	366,475
1916.....	1535	649,042
1917.....	2207	1,074,778

The export committee of the N. A. C. C. will send a delegate to the National Foreign Trade Convention to be held at Cincinnati in April.

HIGHER MATERIAL MARKETS WILL MAKE ENGINES SCARCE.

Because of the shortage of iron and steel due to the demands for war needs, there is scarcity of materials for oil fuel engine manufacture, which will be realized soon in higher prices, as manufacturers not having long contracts are paying much more for stock and little can be obtained.

Ed. H. Witte, president of the Witte Engine Works, 2280 Oakland avenue, Kansas City, Mo., which is said to be the largest exclusive engine builder in the world selling direct, says: "We are still offering immediate shipment on both kerosene and gasoline engines in all styles and sizes. I don't know how long we can keep up, but those who order now can get an engine at a favorable price as compared with what we may have to ask later. In view of the fact that labor will be high and men hard to get, a reliable engine is most desirable, as it will take the place of two to six men, according to the work to be done and the size of the engine used. I will be glad to mail my new book, "How to Judge Engines," to all who are interested in shop power. This book contains valuable information as to what kind of work an engine should do, and the kinds of engine best adapted for general use with all kinds of fuel. The book will be mailed free upon application.

Fiat Plant Sold to Duesenberg Motors Corporation

Small Part of Establishment Retained
for Assembly of 1918
Cars.

The Duesenberg Motors Corporation has acquired the major part of the Fiat plant at Poughkeepsie, N. Y., and will use it to meet the needs of larger manufacturing facilities, which has already made necessary the expansion of the Duesenberg factory at Elizabeth, N. J. The Fiat company has retained a small portion of its plant to carry out the assembly of the Fiat cars for 1918 and to furnish repair parts and service.

EIGHT NEW MEMBERS IN MOTOR AND ACCESSORY ASSN.

Eight new members were elected at the last monthly meeting of the Motor and Accessory Manufacturers' Association and President C. W. Stiger appointed C. E. Thompson as national councilor and delegate and T. J. Wetzel and E. H. Broadwell as alternates.

The new members of the association are: Thomas Dunham Co., Aurora, Ill.; C. A. S. Products Co., Columbus, O.; Union Switch and Signal Co., Swissvale, Pa.; F. A. Ames Co., Owensboro, Ky.; Hill-Smith Metal Goods Co., Boston, Mass.; Brewer-Tichenor Corporation, Cortland, N. Y.; Carlisle Cord Tire Co., New York City, and the Oldberg Manufacturing Co., Detroit, Mich.

CHAMPION IGNITION WILL MANUFACTURE SPEEDOMETER.

The Champion Ignition Co., Flint, Mich., has been developing a new design of speedometer for the past year, which will be placed on the market in the near future. It has been under test for over 18 months and the company officials are satisfied that it is a complete success.

A speedometer department has been established by the company and placed in charge of Russell Baldwin, who was representative of Stewart-Warner equipment sales in the Michigan territory. The engineering work in connection with its production will be in charge of Joseph Berg, formerly chief engineer of the Stewart-Warner Co., who recently joined the Champion company's organization.

BARRETT WITH THE PHILADELPHIA BATTERY.

G. L. Barrett, formerly president and general manager of the Willard Storage Battery Co. of Texas, has been appointed manager of the southwestern division of the Philadelphia Storage Battery Co., with headquarters at 2605 Locust street, in the Coliseum building, St. Louis, Mo.

The Famous Liberty Engine Described in Detail

Major Vincent, One of the Designers of Engine, Gave History of Development and Answered Questions About Its Construction

DETAILS of the Liberty engine direct from the designers was the feature of the memorable annual meeting of the S. A. E. at New York, Jan. 10. Nearly 30 new standard or recommended practises were passed upon and will be put immediately into effect in aviation work. Major J. G. Vincent, co-designer, with Major E. J. Hall of the Liberty aircraft engine, gave the story of its development and then for a half hour answered questions covering practically every detail.

From a digest of Major Vincent's replies to these questions it is learned that the cruising radius of the plane is a matter of load, speed and plane design, and is easily up to 600 miles.

The 12 will be the only Liberty engine in production. There is no idea of building anything else at the present time. Improvements will be incorporated from time to time and a gear type may be added to the direct connected engine now manufactured.

As to ignition, the increased speed and number of cylinders operate against the magneto as the best form. Two separate sparks per cylinder must be furnished and they must be independent in every respect so that should one go out of order the other will fire regularly. While the magneto is now questioned, there is every disposition on the part of the engineers to listen to suggestions on both types, and the ignition, as now provided, is at least as good as could be designed. The committee is going right ahead with what they have in ignition since nobody has as yet offered a system which is as light as the one now in use.

Regarding weight per horsepower, the engine originally weighed 786 pounds and delivers 400 horsepower at 1625 revolutions per minute. Due to the strength-

ening of certain parts the weight has been increased and is now 801 pounds, giving two pounds to the horsepower, the weight per horsepower on the best French machines, such as the Hispano geared type, as the engine weighs 520 pounds and produces 220 horsepower. There are two compressions on the present Liberty engine, a compression ratio of five to one, or 20 per cent., being used on the navy machines, and a ratio of 5.4 to 1, or 18 per cent. on the army machines. This is because the army machines do their flying at above 10,000 feet elevation and get up to this height just as soon as possible. This compression is based on the best practise abroad, although experiments are being made on higher compressions, and it is known that a six to one ratio can be provided without trouble.

For lubrication a good grade of mineral oil is quite satisfactory. The supply of castor oil, which is the more desirable, has lately been increased, but there is no difficulty on the score of lubrication.

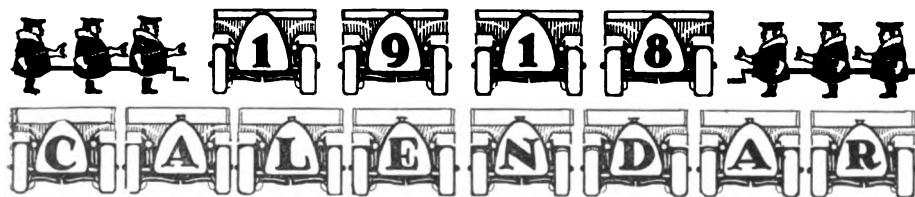
Major Vincent also said: "If 48 engineers had been put on the Liberty engine job it would never have been built." There is a great amount of research work still to be done, particularly as regards performance at altitudes of over 20,000 feet, and it is this high altitude work which is most important. The lessons learned by studies at the top of Pikes Peak have not all been applied as yet, owing to lack of time. The 400 horsepower engine means only 200 horsepower to the aeronautic man, as he is used to operating where pressures are down to 45 per cent. of atmospheric.

As to spark plug trouble, it has been possible with the special design of cylinders to bring the water close to the plugs. The Liberty engine is not a hard engine, relatively speaking, as regards spark plugs, particularly as no real ex-

treme compressions are used. Carburetion is not exactly right even now for the high altitudes. No starter is necessary on the machines now under construction, as it is impossible to stop the Liberty engine, once the machine is in the air, as it cannot be driven slowly enough to stop the engine from turning over.

No necessity appears for an engine with four valves per cylinder, one of the suggestions as four valves are harder to cool and are apt to cool unequally. Until the lift equals one-quarter of the diameter of the valve the full value of the valve is not obtained. There is a possibility of there being, at some future time, an engine with two inlet valves. There is no radical feature in the valve timing, as the exhaust opens 52 degrees before bottom centre and the intake closes 45 degrees as to bottom centre.

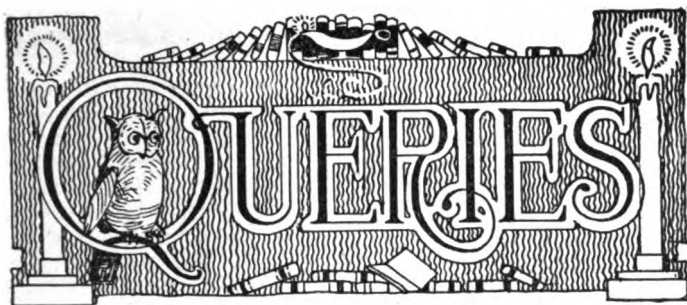
The ignition apparatus weighs 29 pounds, including the battery. The fuel feed is by pressure system, with a pump on the engine and a blow-off valve in the tank. The valve mechanism is operated by a rocker through a bearing, and any oil getting out must escape through this bearing, thus lubricating it. The piston clearance was at first set at .016 inch, but after increasing the diameter of the valve 1/16 inch, resulting in a gain of 12 pounds m. p. pressure, the clearance was raised to .020. The piston is straight up to the bottom of the top ring. The engine is a dry crank case type and the cylinder dimensions are 5x7. The period of the engine is at 1200 revolutions per minute, and in making tests propellers are used while the power curves are taken on an electric dynamometer. Domestic materials only are employed in the manufacture. The valves are 2 1/4 inches in the clear, with a life of 3/4 inch for the exhaust and 7/16 for the intake.



New York, Bronx dealers' automobile show, Armory, 166th St. Feb. 9-16
St. Louis, Mo., automobile show Feb. 11-16
Toledo, O., automobile show Feb. 11-17
Newark, N. J., automobile show Feb. 18-23
San Francisco, second annual automobile show Feb. 16-24
Waterbury, Conn., automobile show Feb. 18-23
Des Moines, Ia., automobile show Feb. 18-23

Syracuse, N. Y., automobile show Feb. 18-23
Grand Rapids, Mich., automobile show Feb. 18-23
Springfield, O., automobile show Feb. 18-23
Pittsfield, Mass., automobile show Feb. 18-23
Brooklyn, N. Y., motor vehicle show Feb. 22-March 9

Omaha, Neb., automobile show Feb. 23-March 2
Muskegon, Mich., automobile show Feb. 25-March 2
Boston, Mass., Boston Automobile Dealers' Association show March 2-9
St. Joseph, Mo., automobile show March 6-9
Trenton, N. J., automobile show March 20-23
Great Falls, Mont., automobile show March 16-20
Bridgeport, Conn., automobile show March 25-30
Stockton, Cal., automobile show April 9-13
Chicago, Ill., accessory show for Ford accessories Sept. 23-28



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

WHAT FUEL MIXTURES HAVE YOU TRIED AS SUBSTITUTES FOR GASOLINE AND WITH WHAT RESULTS?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 5th of March. The contest is open to every one.

LUBRICATING THE AUTOMOBILE.

(A. Hammond, Wellesley, Mass.)

Best Letter.

Too little attention is given by most drivers to the proper lubrication of their automobiles. Proper attention to the lubrication system begins with the selection of the oil, which to give the best results, should be the one that overcomes friction and reduces to a minimum the wear and tear of the working parts.

Practically all manufacturers of automobiles and engines, after much thought and experiment, have adopted a certain grade and make of oil, either heavy, medium or light grade, that they can safely recommend for their particular machine, and it is always advisable to follow their advice in purchasing lubricant.

One of the most important instruments on the dash is the oil gauge. This device is to the driver what the water gauge on a boiler is to an engineer. When driving it should be consulted very frequently to be sure that the oil circulating pump is functioning properly and all bearings are being fully lubricated. At various engine speeds the pressure indicator points to certain marks, which show the amount of pressure in the oiling system.

On the car which the writer drives (Pierce-Arrow), the pressure is from one to one and a half pounds per square inch, with the engine throttled and running at normal. When running at high speed the pressure increases to nine pounds and sometimes runs as high as 14 pounds. This pressure indicates normal operating conditions. When the engine is cold the pressure is much higher. By making comparisons with the speedometer and knowing the relative oil pressures one can immediately note any trouble in the oiling system.

The manufacturers of this car advise the changing of oil

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Your engine is no better than its ignition and cannot be.

BOSCH MAGNETOS

are the world standard of efficient and dependable ignition.

To insure yourself satisfaction, whether as manufacturer or owner, specify Bosch.


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ZENITH CARBURETOR

KNOWN the world over as the *zenith* of carburetor efficiency. A long list of American builders of cars, trucks and aeroplanes, believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

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New York Detroit, U.S.A. Chicago

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Published Monthly

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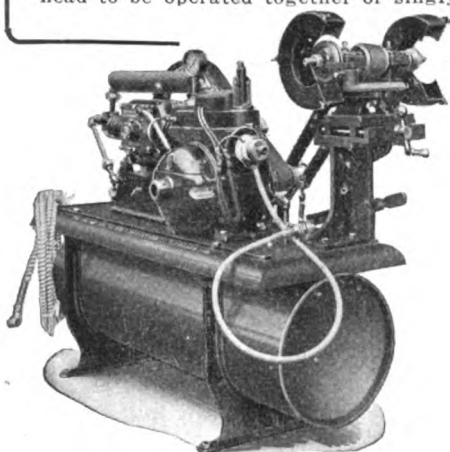
A magazine for business men devoted to the promotion of highway haulage efficiency. It is the national authority of vehicular transportation.

AUTOMOBILE JOURNAL PUB. CO.
Times Building Pawtucket, R. I.

This buffing or grinder head is made according to the most approved design and is suitable for handling tire roughing wheels and polishing or grinding wheels. It will handle two wheels of eight-inch diameter and the construction is as strong and rigid as could be desired or required.

The motor is of sufficient capacity and the entire machine so designed as to permit the compressor and wheel head to be operated together or singly. Automatic controls prevent overcharging of the air tank and the entire construction of the unit is as near fool proof as possible.

Automatic controls prevent overcharging of the air tank and the entire construction of the unit is as near fool proof as possible.



A New Money Saver for Garage and Tire Shop

AT THE New York Auto Show tire repair and garage men saw, for the first time, a machine that exactly meets a crying need they had experienced for a long time. This machine was the DeLuxe Combined Two Stage Automatic Air Compressor and Buffing or Grinder Head—Two Valuable Machines in One.

Having known the DeLuxe Air Unit for several years as an unequalled success, and seeing the new improvements incorporated in a manner that assured absolutely satisfactory results, it is needless to say that an unprecedented number of orders were placed at once.

Every tire shop requires air facilities and tire roughing equipment, while every garage must have free air service and grinding wheel facilities. The practise has necessarily been to buy an air compressor with a motor and a buffing head with a motor or countershaft equipment from which to run it.

This new DeLuxe unit combines all this necessary equipment in one machine, to the definite and valuable advantage of purchasers. It saves the cost of an extra motor, avoids the necessity of buying a countershaft, conserves valuable floor space, saves expense in installation and gives results not only equal, but superior to the old method.

The many advantages of this new unit are described in detail in a special circular just issued. Write for a copy today.

**See Our Exhibit
at the
Auto Shows**

Chicago—Space 3

Coliseum Basement
January 26 to February 2

Boston—Space 518

Mechanics Building
March 2 to 9



**U. S. Single Stage
Automatic Air Unit
Equipment D22**

Cap. 2½ Cu. Ft. Per Minute.

An automatic single stage outfit for maintaining a supply of air ready for use at any time. Suitable for garage, free air service, etc.

The United States Air Compressor Co.
6538 Carnegie Ave. Cleveland, O.

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once every 350 miles. Conditions alter this rule, however, and when the car is run on muddy or sandy roads the oil should be changed more often. The writer's rule is to change the oil every 300 miles. Before removing the old oil he runs about one gallon of kerosene through the carburetor, while the engine is running, to loosen the carbon in the cylinders. After doing this all of the lubricant is removed from the base and the base filled with kerosene. With the spark plugs removed the engine is turned with the hand crank or starting motor until the oil has been forced into every part of the engine, cleaning out the old lubricant and washing it into the base.

The drain is then opened, the kerosene removed and new lubricating oil put in. Before starting the engine on its own power it should be turned over three or four times to work the lubricant into the system.

By following this rule very carefully one will always have a clean engine, plenty of power and few repair bills. The writer has run his car for 35,000 miles and knows that when it is taken down for repairs there will be no damage which can be traced to lack of oil or poor lubrication.

NOTE—The above letter should apply to practically any force feed system fitted with an oil gauge, indicator type. On some force and circulating oil systems the gauge shows circulation only and does not indicate in pounds pressure. On systems of this type the operator should pay constant attention to the gauge and be sure that the oil is circulating through it at all times. Oil removed from the system should never be used again in the engine. It may be filtered and used for unimportant parts, such as springs, knuckles, etc., or on lathes.—Editor.

CARE OF THE ENGINE LUBRICATING SYSTEM.

(H. Weikel, Quakertown, Pa.)

Second Best Letter.

There is no one thing which is the primary cause of more trouble and causes more expense in maintaining an automobile engine than poor or insufficient lubrication. While it is manifestly impossible to tell or give exact instructions that will fit every case, or formulate any particular rule for changing oil, there are rules which, if followed, will give satisfaction.

One should always remember that where one metal part moves upon or in contact with another, friction is created and this means wear. In this way the metal will be slowly destroyed, unless oil is introduced, forming a film or surface between the friction surfaces and preventing their contact.

Too much oil is better than too little, but excessive lubrication results in carbonization in the gasoline engine. Too little oil results in excessive wear, so that one should aim to supply just enough lubricant.

Much can be said regarding the choosing of proper oil, but not every buyer can make complete tests. Care should be observed, however, not to use an acid oil. Every user should carry blue litmus paper in the car and test all oil before it is placed in the engine. The presence of acid in the oil is indicated by the turning of blue litmus red.

To attempt economy by purchasing inferior or cheap oils usually results in excessive carbonization and sometimes the destruction of the bearings or the damaging of other parts of the engine. Like every other commodity a fair price secures a good article, which is of the utmost importance.

In purchasing the oil one should insist on a well known brand. He should be sure that it is free from dirt and grit and by straining it through fine muslin or copper mesh remove all foreign particles that might have fallen into the oil before it reached the purchaser.

Practically all of the oil manufacturers give data relative to physical properties of their oils and though figures are not always an absolute indication of worth, I prefer an oil giving the following results: For winter service the oil should have a specific gravity of between 30 and 32 Baume at 60 degrees; a flash test of 440 degrees or higher; a fire test of 490 or 500, all temperatures Fahrenheit; a viscosity of 90 at 212 degrees by Tagliabue viscosimeter and a cold test of plus 10 degrees.

For winter service the oil should have a flash test of 360

degrees or higher; a cold test of minus 10 degrees; viscosity not above 200 at 70 degrees.

After having decided on the grade of oil to use the first thing to do is to clean the engine. Be sure that all oil channels are thoroughly cleaned, then fill the engine with oil to the correct level. This level should be watched closely and enough oil kept in the system to keep the indicator above the "empty" position. Should the indicator or level fall to "empty" and the engine be in operation, it should be stopped immediately until the oil has been replenished.

The indicator on the dash should be noted occasionally and should the hand vibrate or indicate no pressure or passage of oil, the engine should be stopped and the system examined. Under no conditions should the machine be operated with insufficient oil or pressure.

Oil that is satisfactory for summer use frequently congeals at the low temperatures of winter, a condition that is usually indicated by the dash indicator, which shows no passage of oil or excessive pressure at normal speed. Congealed oil is nearly as bad as no oil at all and in a case of this sort the oil should be replaced with oil of a lighter grade.

At the end of every 1000 miles the oil drain plug should be removed and the oil removed from the system. This oil should be discarded and new oil put into the system. After two or three fillings, while the old oil is out of the system, the system should be cleaned with kerosene.

My personal method is to replace the old oil with a mixture of three quarts of kerosene oil to one quart of engine oil, and to turn the engine over a number of times, or run it for a minute or so at low speed so as to fill the system with the mixture. Then drain off the mixture and replace it with new lubricating oil.

By observing care, keeping all lubricant absolutely clean and renewing the oil every 1000 miles I keep my engine in good condition and seldom have troubles arising from poor lubrication.

NOTE—Mr. Weikel's requirements for oil might be considered as extremely high, since they represent the ideal. Atlas medium oil, refined from a paraffine base, and a well known lubricant shows the following tests: Specific gravity, 30 Baume; flash point, 430 degrees; fire test, 480 degrees; cold test, 30 degrees, and viscosity at 100 degrees, 300 seconds, Saybolt universal viscosimeter.—Editor.

MAKING IGNITION COIL CONDENSER. (A. S., Washington, D. C.)

I have an old secondary coil which was taken from an automobile ignition system. This coil I have been using for a stationary engine, but recently the condenser broke down. I would like to use the coil and if possible make a new condenser to fit the coil. Can you give me directions for doing this? Where in the circuit should the condenser be connected? The coil still buzzes without the condenser, but the spark is weak.

The making of a condenser is a simple matter and the only trouble you will encounter will be in getting the proper size. A condenser consists of a certain number of tin foil sheets placed one over the other, insulated from each other, and alternately connected, making two sets. To each set one terminal leads to the vibrating mechanism of the coil. Take two coarse toothed combs and slip the teeth of one comb between the teeth of the other and assuming that all the teeth of one comb are insulated from the teeth of the other you have an arrangement similar to the condenser, only in the latter the teeth are strips of tin foil.

There are two methods of making a condenser. The first is of the alternate plate; the second is "around and around." The materials required are thin tin foil, waxed paper and shellac. Cut a great number of waxed paper squares, the size of the condenser desired, or the size of the bottom of the coil box. We will assume that these papers are cut two inches square.

Next cut an equal number of tin foil squares, measuring $1\frac{1}{2}$ inches on the side and each having a projection on one side one-half an inch long by one-half an inch wide.

Place a square of oiled paper on the table and upon it one of the tin foil pieces, leaving the projection out beyond

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FRICITION is the BUSY BEE that takes the HONEY out of MOTORING

It takes the sweetness out of the running qualities of your car. It removes the joy and makes your car too intimate with the repair shop. **Kill friction.** Do it effectively and efficiently with



It will keep your car a better car for a longer time. Non-Fluid Oil in the transmission, differential and bearings will check the wear and tear of friction. Will quiet gears, cushion metal to metal contacts and make your car the sweetest running thing on wheels.

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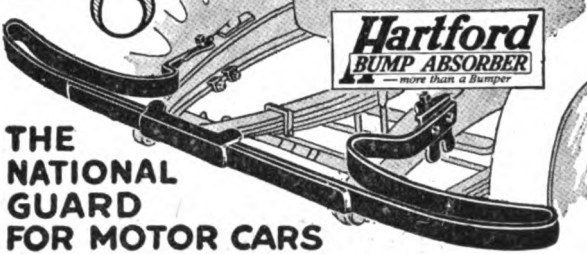
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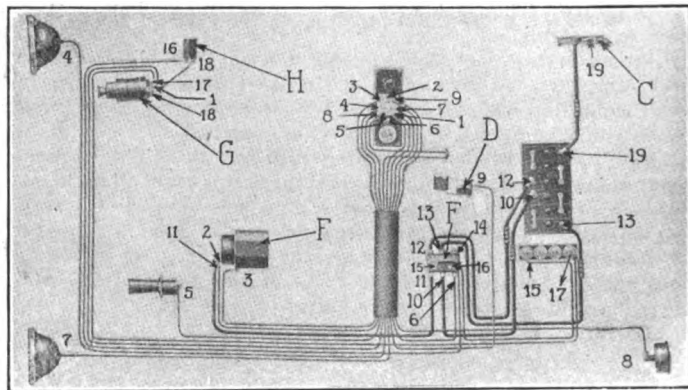
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the edge of the paper square, but the rest of the tin foil evenly spaced on the paper.

Next place a square of paper and another piece of tin foil, but have the projection on this tin foil extend on the opposite side of the paper square. Build up the condenser in this way, having a piece of waxed paper between the tin foil pieces, and having every second tin foil piece connected with the projections. After about 30 tin foil strips have been used try the condenser on the coil, connect one set of discs with the vibrator tongue and the other with the post which contacts with the vibrator tongue. Experiment will soon show the point where the addition of the tin foil pieces ceases to increase the size of the spark. The whole assembly should be shellacked well, so that it will not fall apart.

In constructing the second type the waxed paper is not cut into squares, but in long strips, half an inch wider than the tin foil, which is also cut into strips. Place a long strip of waxed paper on a flat surface and lay a strip of tin foil upon it, then a second strip of paper and a second strip of tin foil. The waxed paper should extend beyond the end of the tin foil for at least half an inch. The three strips should then be rolled into the form of a tube, the two tin foil strips being insulated from each other by the strip of waxed paper. The length of the strips may be varied according to the size of condenser required and must be determined by experiment.

Each strip of tin foil is connected with the vibrating mechanism as directed above. The tube may be pressed flat after it is finished if a flat condenser is more desirable.



Maxwell Wiring Diagram: C, Frame; D, Regulator Shunt Contact; F (Right), Starter Switch; F (Left), Motor Generator; G, Magneto; H, Ignition Coil; Other Numbers Show Terminals and Are on Diagram to Enable One to Trace Wiring.

QUESTIONS ON MAXWELL 1916 CAR.

(W. H. A., Rochester, N. Y.)

During the summer I have been troubled with the grease leaking from the rear axle of my Maxwell 1916 car. This grease works out and on to the brake bands, often rendering the brake bands inoperative. If I should drill two or three holes in the rear housing, between the differential and wheel flanges, would the trouble be stopped?

This car is fitted with a magneto which takes current for starting from four dry cells. Would it be possible to connect the storage battery with the magneto and use current from this source rather than the cells?

Though the boring of holes in the rear housing might be effectual inasmuch as the excess leakage into the brake band section is concerned, you would be troubled constantly with grease leakage through the holes and would be obliged to replace grease very frequently.

The correct repair to make in this case is the placing of a heavy felt washer in back of the two differential ball thrust bearings. These washers should be just large enough to fill the housing back of the bearings and bind on the shafts. Be careful that they do not fill the bearing chamber or rest on the bearing seats.

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Full floating rear axle with spiral bevel driving gears.
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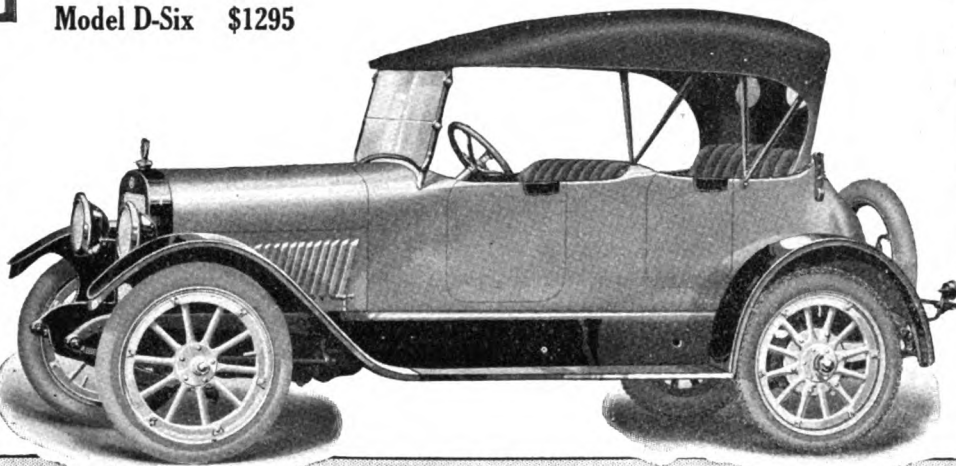
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Model D-Four \$1095

Model D-Six \$1295



To put these washers in place the rear axle must be disassembled and the differential removed. Though this repair entails considerable work you will find that the money saved in grease will amply repay you.

The electrical system of the Maxwell 1916 car is somewhat complicated and does not admit the use of the storage battery with the magneto for ignition purposes. The storage battery consists of two sections of three cells each. During the cranking operation the cells are connected in series and furnish 12 volts to the starting motor. As soon as the starting pedal is released the series connection is broken and the batteries draw six volts from the generator and are connected in two sets of three cells each. In the latter case each set of three cells is grounded to the frame, forming a single wire system.

The magneto in itself is grounded. This ground connection being used when the machine is generating current. With this peculiar arrangement a grounded battery source cannot be used without damaging the battery or the magneto.

THIRD BRUSH GENERATOR REGULATION.

(A. E. H., Boston, Mass.)

I have had quite a number of cars at various times, with different types of equipment. On one of the cars the generator output was regulated by what was termed a reverse series winding; while a later car, with the same make of equipment was fitted with a generator regulated by a third brush. Will you kindly tell me the theory upon which these two types of regulators operate?

There are two well established rules which form a basis upon which the third brush regulation system is designed. The first is that with any type of generator having a rotating armature winding and commutator device the maximum voltage obtainable from the armature will be from the two commutator segments farthest away from each other and will decrease as the distance between them on the circle de-

creases. The second is that as armature speed increases there occurs a certain distortion in the lines of force between the two field poles, and the voltage between two fixed brushes drops in proportion with the speed of armature rotation.

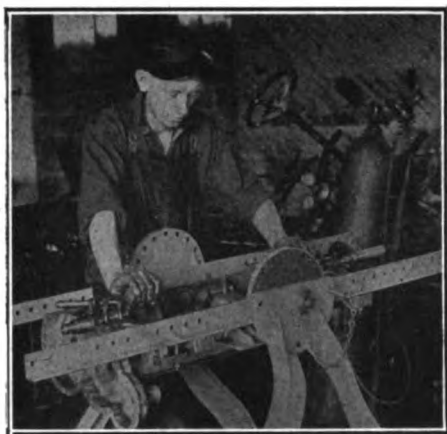
The simple form of generator fitted with a third brush regulator has two collecting brushes, set opposite each other on the commutator, and a third brush about three-quarters of the distance between the two brushes, connected with one field winding terminal. The second field terminal is connected with the brush farthest away from the third brush. The two opposite collecting brushes are connected with the line or storage battery through suitable cutting out device.

When the armature starts to revolve the generated current is collected by all three brushes, the offset brush, which we term the third brush, and one of the line brushes furnishes current for the field winding, and the generator magnetism begins to "build up." With the increase in armature speed the amount of current passing into the fields and line continues to increase until the distortion of magnetic lines of force cut down on the voltage between the third brush and line brush. As soon as this happens the current in the line ceases to rise with the increase of armature speed. With a further increase of armature speed the lines of force are still further distorted, and as a result the proportions of current reaching the field winding is not increased.

The position of the third brush, since it governs the amount of current passing into the field coils, therefore determines the maximum amount of current generated. By setting the third brush around in the direction of armature rotation the voltage output of the generator is increased; an opposite effect is had by setting the brush back toward the other line brush or opposite field brush.

On the reversed series regulation the basic rule is that any generator continues to "build up" as long as the field magnetism continues to increase. A conventional type of shunt winding is employed for the field circuit that is, each terminal of the field circuit is connected with one of the armature brushes. Under this condition you can see that as

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the armature speed increases the generated current increases and the fields consequently are made stronger, which in turn increases still more the voltage of the machine.

In order to prevent this continuous "building up" of the fields a reverse series winding is provided. This winding is so connected that all of the line current passes through it in a direction contrary to that of the shunt winding. As the line current increases the current through the reverse series winding tends to neutralize the magnetism excited by the shunt winding, thereby decreasing the magnetism and keeping the current output balanced.

VIBRATOR AND VIBRATORLESS SYSTEMS.

(S. R., Chicago, Ill.)

Will you kindly tell me why some of the manufacturers of ignition systems have coils which do not have vibrators and others like the Ford car are fitted with vibrating coils? The systems like the Ford do not seem to operate if vibratorless coils are substituted.

The timing device on a vibrator coil fitted machine is not arranged to make and break the circuit quick enough to produce a secondary spark of sufficient strength to ignite the charge in the cylinders. Contact is made by a timer, which usually has either a wiping or rolling contact, and the current flows an appreciable length of time.

One of the laws regarding secondary coil installations is that a secondary current is induced only when the primary circuit is broken, and in a measure the strength of the spark depends upon the quickness of the break. For this reason vibratorless coil systems have a mechanism, usually operated mechanically by the engine, which breaks the contact very quickly. With this system only one spark is formed and that at the moment of break, while with the vibrator systems a shower of sparks takes place.

HIS ENGINE RUNS UNEVENLY.

(S. R. S., Philadelphia, Pa.)

I have recently been having considerable trouble with my Ford 1916 car. When the car is first started, and for some little time after, the engine runs very smoothly and gives all the power necessary. After it has warmed up, however, cylinder number three develops an intermittent skip. Every once in a while this cylinder seems to miss fire entirely. What do you think is the trouble?

Your trouble is probably due to faulty ignition and should be easy to trace. Remove the spark plug from number three cylinder and replace it with a plug from one of the other cylinders that is giving no trouble. Place the plug from number three cylinder in the other cylinder and run the engine until the skip develops. If the missing cylinder "follows" the plug, indications are that the plug is at fault and should be repaired or replaced.

Remove the top binding nuts and the large porcelain or mica retaining gland nut from the body and take out the porcelain or mica. Clean all parts in kerosene and inspect the insulation. New insulator parts may be obtained from the plug manufacturers.

Very frequently a broken porcelain gives considerable trouble because upon first inspection the break is unnoticed. Trial of the plug outside the engine may fail to reveal the break because of the low atmospheric pressure. When the plug is in operation the current has to leap across a gap inside the cylinders where the pressure is extremely high. Even though the electrode points out but 1/32 of an inch apart the high pressure offers such resistance to the current that this distance is equal to nearly half an inch under atmospheric pressure. The spark will then follow the line of least resistance and jump between the plug body and the centre terminal, provided there is a small crack or break in the insulating material.

While the plug is cool, if the insulating material is mica, shellac or liquid ceiling material fills up the break. As soon as the plug heats the ceiling material does not offer so much resistance to the current and the current passes through the break.

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Another factor which might make for poor plug efficiency is electrode setting. In adjusting the spark plug points they should be so bent as to pass each other when heated; that is, the expansion of each electrode endwise should not effect the width of the spark gap.

If by transposing the spark plugs you do not locate the trouble at this point, examine the valve setting. The distance between the valve stems and push rods should be sufficient to allow the valves to seat when the tappets are not riding on the top of the cams. This distance varies in different engines. In the Ford it should be between 1/64 and 1/32 of an inch. With the engine heated to operating temperature turn the hand crank over until the piston in number three cylinder is on the explosion top centre, then see if you can turn the tappet with your fingers. If the tappet turns freely and does not touch the valve stem, this adjustment is all right. If it binds against the valve stem the stem should be faced off with a fine file until the adjustment is correct.

The Winther Motor Truck Co., Winthrop Harbor, Ill., which was organized only a year ago, reports it has designed, tested out, completed and marketed six different models of Winther trucks chassis, and on the 19th of January a dividend of seven per cent. was paid on the preferred stock of the company.

OVERHAULING THE OLDSMOBILE.

(Continued from Page 19.)

The rear universal joint should next be disconnected and the drive shaft removed. Provision is made in both joints for wear and new bushings should replace the old, if there is the least lost motion in either of the universals.

Rear Axle Repairs.

The rear axle is of the full floating type and can be disassembled without removing the housing from the car. Unscrew the wheel hubs and take off the large dust covers, exposing the driving flanges, which are retained by six nuts, and should be removed, together with the axles.

The driving pinion and differential assembly are mounted on one member, called the differential pinion gear housing. This housing, as well as the axle cover plate, opposite it, should next be removed and the differential assembly disassembled as follows:

Remove the two differential bearing retaining caps and lift out the differential case. Examine the ball thrust bearings carefully and unless they show signs of wear or need replacement, do not alter the bearing adjustments or remove the bearings. If the bearings and adjusting nuts are left undisturbed the pinion adjustment will be much easier than if the adjusting nuts were changed.

Unbolt the two portions of the differential case and the disassembly of the differential is complete. Be sure that the master gear is tightly fastened to the differential housing, for if it is loose much strain will be put upon the axles.

After the universal joint flange, which is keyed and held by a lock nut, has been pulled from the pinion gear shaft, the pinion gear and shaft may be removed from the rear of the housing, while the bearings may be removed with the bearing adjustment nut from the front.

In reassembling the differential and pinion gear the proper adjustment is a matter of extreme importance. The pinion gear is first put into place with the bearing and the universal joint flange replaced. It is essential that all bearings are clean and bottom against their respective seats.

With the pinion gear in place, turn the pinion adjustment and the master gear or differential adjustments until the two gears mesh deeply or "bottom" and the edges of the teeth on both gears line up together. The differential or master gear should then be adjusted away from the pinion gear 1/64 of an inch to allow proper clearance.

To the universal joint flange on the pinion attach a wood handle so that this shaft can be turned by hand. The pinion should turn smoothly and practically without noise, proper adjustment of the pinion and master gear may then be made. There should be practically no side play in the differential housing, though the adjustments should not be turned so as to bind the assembly.

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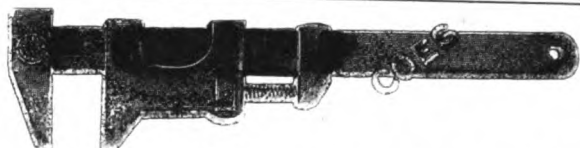
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TIMES BUILDING, PAWTUCKET, R. I.

The rear wheels are mounted on ball bearings and are removed by unscrewing the lock nut on the end of the housing. Since all of the car weight is supported on these ball bearings they should be given a careful inspection and replaced upon signs of wear.

The front wheels are mounted upon roller bearings in the conventional manner. When these wheels are replaced be careful not to adjust the bearings too tightly or they will soon be destroyed. A roller bearing to give good service should have a slight amount of play.

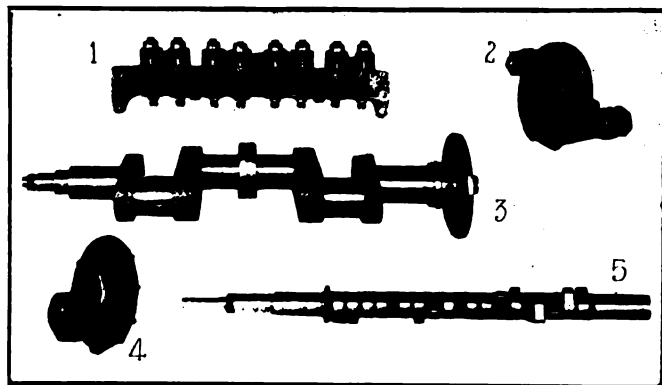
The steering gear is of the worm and half nut type and is easily disassembled by the removal of the top cover and side plate. End play of the steering column and worm is adjustable through a nut on the upper end of the steering gear.

Timing and Adjustments.

The timing on both models should be adjusted before the engine is replaced in the chassis and before the timing gear case cover is replaced. Turn the camshaft in a counter clockwise direction until the intake valve in No. 1 cylinder (first cylinder on the left, facing engine,) is about to open, then turn crankshaft until the piston in No. 1 cylinder is past the top centre and just started on the down stroke, replace the timing gear. If the teeth do not mesh at this point turn the crankshaft forward until the gears will mesh. If the timing gears have been marked properly the marks should be followed and the above directions used to check up the setting.

Model 45 was fitted with an automatic spark advance mechanism, but model 44 was not; in either case the ignition unit setting remains the same and the engine is designed to fire at dead top centre with spark fully retarded.

Retard the spark lever on the steering wheel quadrant



Model 44 Engine Parts: 1, Valve Tappets and Cage; 2, Water Pump Body and Rotor; 3, Crankshaft; 4, Water Pump Cover; 5, Camshaft.

and after locating the secondary lead wire for No. 1 cylinder remove the secondary or distributor head from the unit. Take off the distributor brush and unscrew the cam retaining screw. Turn the crankshaft until the piston in No. 1 cylinder is at top centre on the firing stroke, at which point both valves will be closed. Turn the cam in the distributor around in its normal direction of rotation until the breaker points snap apart and the distributor brush can be put in place beneath the segment connected with No. 1 cylinder wire. Then tighten the cam retaining screw.

Two types of carburetors were used, very similar to each other, the first being fitted with a low speed adjustment that was later discontinued. To adjust these carburetors open the needle valve about one-half a turn from its seat and close the low speed adjusting screw.

Start the engine and allow it to run until it has warmed to operating temperature, then close the needle valve as far as possible without slowing down the engine. If upon quick acceleration the engine back fires, open the needle valve until the fault is corrected. If upon rapid acceleration the action is sluggish it is an indication of too rich a mixture and the needle valve should be closed slightly.

The low speed adjustment should be made so that the engine can be throttled down to its minimum speed and is made in conjunction with the adjustment of the throttle stop screw.

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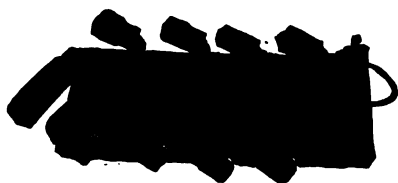
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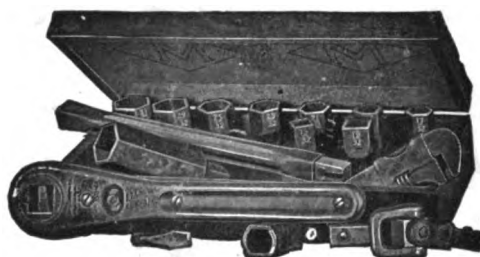
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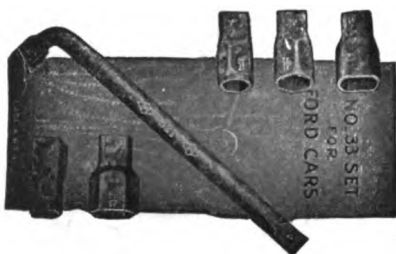
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No. 15 "Major" Set—Covers all adjustments on Fords, including reversible ratchet handle. Price each, \$5.00.



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VOL. LXV.

PAWTUCKET, R. I., FEBRUARY 25, 1918.

NO. 2.

SUPREME AUTO OIL FLOWS FREELY AT ZERO

Starts With the Engine

THERE is history in the scrap heap. Any junk dealer will tell you of burnt-out bearings and scored cylinders—the result of poor lubrication, and oftentimes—no lubrication.

"No lubrication" does not always signify the lack of oil in the crank case. Many cylinders have been scored with the crank case bountifully supplied—the oil lying sluggishly in the case during the warming-up period—not performing its function—not starting to flow when the engine starts—

All oils do not possess the Low Cold Test feature—notably the paraffine-base oils, which thicken up under cold and often cause great damage to the motor.

Ask for SUPREME AUTO OIL,—it "Flows Freely at Zero" and leaves less carbon owing to the fact that it contains no paraffine to gum, stick or thicken.

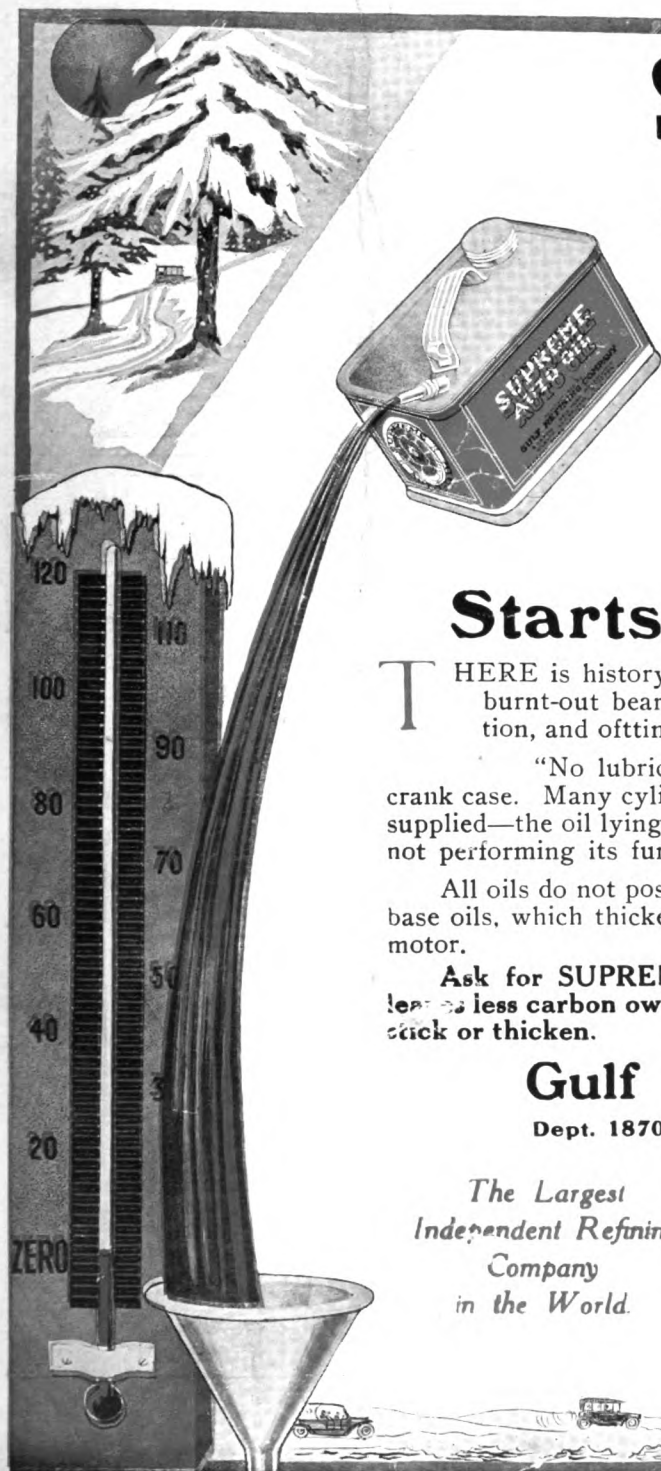
Gulf Refining Company


Dept. 1870

Pittsburg, Pa.

The Largest
Independent Refining
Company
in the World.

There is **MORE POWER** in
THAT GOOD GULF GASOLINE
AND SUPREME AUTO OIL





Gentlemen may cry peace,
peace—but there is no peace.
* * * Our brethren are al-
ready in the field! Whystand
we here idle? * * * Is life so
dear, or peace so sweet,
as to be purchased at the
price of chains and slavery?
Forbid it, Almighty God! I
know not what course others
may take; but as for me,
give me liberty or give me
death!

—Patrick Henry, 1775

RFH

ZENITH-CARBURETOR-COMPANY
Detroit, Mich.

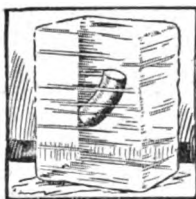
NO INNER TUBES — NO SPARE TIRES — NO SPARE RIMS

SEE THE SENSATION OF THE NATIONAL Auto Shows at Boston

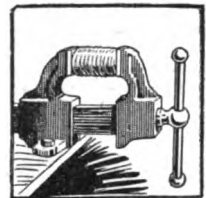
Thousands of spectators viewed the interesting exhibition of ESSENKAY Tire Filler at the National Automobile Show in New York, Chicago and Cleveland. At the end of each week experts found that ESSENKAY was not affected in any way by the boiling water, the solid cake of ice, or the pressure of 2,000 pounds per square inch. All of these tests will again be made at the Boston Show. Visitors will find much food for thought at this remarkable exhibition.



The Heat Test—
Essenkay Boiling in Water



The Freezing Test—
Essenkay Frozen in Ice



The Pressure Test—
Essenkay Compressed in a Vise

THE HEAT TEST A section of Essenkay Tire filler will remain immersed in boiling water continuously from the opening day of the show until the doors close (one week). *There will be an official test of the ESSENKAY thus tested in view of show visitors, and will be examined by experts after the show to prove that the filler has undergone no change.*

THE FREEZING TEST Another section of ESSENKAY Tire Filler will remain frozen in a solid cake of ice for the same period (one week), to demonstrate that it will harden not or be affected by freezing temperatures. The result will be officially observed and attested by competent experts.

THE PRESSURE TEST Another section of ESSENKAY Tire Filler will be confined for a week in a glass tube under great pressure (approximately 2000 lbs. to the square inch) between the jaws of a heavy vise. The pressure will be released at the close of the Show in the presence of experts.

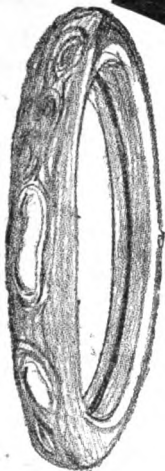
This test will be made to prove that ESSENKAY is not affected by pressure, and that it will return to its original shape and dimensions when the pressure is released. ESSENKAY—ends all tire troubles. Over 16,000 auto owners have proven by actual use that ESSENKAY Tire Filler is truly a satisfactory substitute for air in automobile tires.

FOR
PASSENGER
CARS

Essenkay

A TIRE FILLER

FOR
COMMERCIAL
TRUCKS



The tire shown here was used with ESSENKAY by the Fern Laundry Co., 1908-10 Campbell St., Kansas City, Mo. (one of 16,000 users) assuring "on time" schedules including double mileage and no punctures or blowouts. Being filled with ESSENKAY, instead of air and inner tubes, this tire was used until it wore down to the last layer of fabric.

NO PUNCTURES—NO BLOWOUTS!

Tire Troubles end when your casings are filled with ESSENKAY instead of air and inner tubes. ESSENKAY is an elastic, resilient, durable composition that is not affected by heat, cold, atmospheric, or climatic conditions. It contains no rubber, therefore, cannot harden, oxidize or bloom. It rides like air, and increases tire mileage, because there is no deflation during the life of the tire—no deterioration. We will exhibit a large number of tires at the Boston Automobile Show like the illustration on the left that have run 10,000, 15,000 and 20,000 miles with ESSENKAY. First cost of ESSENKAY is the last cost. When your own casings wear out, the same ESSENKAY may be transferred to new casings.

TEN DAYS' FREE TRIAL

Whether you are going to visit the Automobile Shows or not, send a postcard or the coupon for our illustrated booklet of The Story of ESSENKAY, and particulars of our 10 day free trial offer, which will enable you to test ESSENKAY, free of charge, in the tires of your own automobile over the roughest roads—in all weathers—under all conditions.

THE ESSENKAY PRODUCTS CO.

EXECUTIVE OFFICES: 345 West Grand Avenue, Chicago

DEALERS: This company will consider agency applications from responsible dealers in unoccupied territory

NO PUMPS — NO JACKS — NO TIRE TOOLS

MAIL THIS COUPON NOW

The Essenkay Products Co.
345 West Grand Ave., Chicago

Gentlemen:—Please send me, free of charge, without obligation, your booklet, "The Story of Essenkay." Also the full details of your 10 Days' Free Trial Offer.

Name

Address

City State

(When Writing to Advertisers, Please Mention The Automobile Journal.)



TRADE MARK

EAGLEINE

REGISTERED
MOTOR
OILS

THE ECONOMY OF QUALITY

GREATER power for fuel consumed, increased mileage, longer car service life, and minimized maintenance and repair expense add decidedly to your pleasure and satisfaction. These results are assured to you by the guaranteed quality of EAGLEINE MOTOR OILS.

Users of EAGLEINE MOTOR OILS have clean, smooth-running engines for thousands of miles with little or no attention, and practically no carbonization.

In no instance, for nearly 20 years, have EAGLEINE MOTOR OILS ever failed to meet the most exacting service tests. Their quality is absolutely standard. No more dependable lubricants can be obtained.

SPECIFY trade-marked EAGLEINE MOTOR OILS from jobbers or dealers. Buying in sealed containers insures you against inferior oils.

EAGLEINE GEAR OIL

for transmission and differential gearsets, will give twice the mileage of an equal volume of any other grease, obviates wear and reduces repair bills to minimum.

EAGLE OIL & SUPPLY CO.

44-5-6 India Street

BOSTON, MASS.

Woolworth Building, NEW YORK, N. Y.
1132 West 37th St. CHICAGO, ILL.



ATWATER- KENT

Scientific Ignition

AT THE HOTEL LENOX
DURING SHOW WEEK

Atwater-Kent Sales Co. of N. E.

883 Boylston Street
BOSTON, MASS.

RUSCO BRAKE LINING

**Brake Linings, Clutch Facings,
Clutch Discs and Anti-
Squeak Webbing**

*Will be on exhibition at the
HOTEL LENOX
Show Week*

Atwater-Kent Sales Co. of N. E.

883 Boylston Street
BOSTON, MASS.



Jobbers—Dealers

MEET US AT

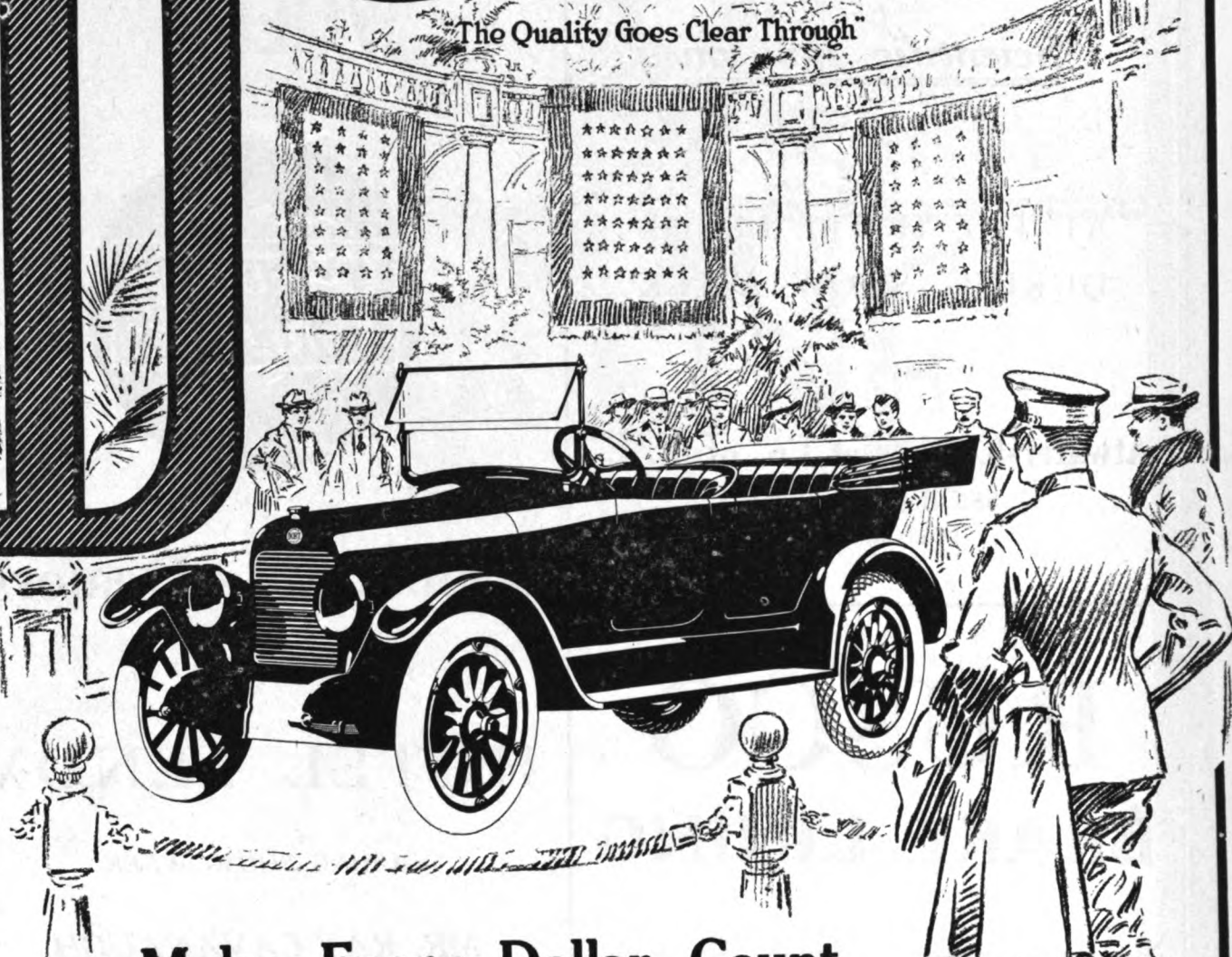
HOTEL LENOX

DURING SHOW WEEK

MR. RAY CAVANAUGH,
*our New England factory repre-
sentative, will be on hand to
show you our complete line.*

DORT

The Quality Goes Clear Through



Make Every Dollar Count

And remember—Dort cars work in perfect accord with the spirit of the times—the spirit that demands efficiency without waste.

While good to look at, comfortable to ride in, convenient to drive and thoroughly dependable, not one unnecessary dollar goes into the operation and maintenance of a Dort.

Light on oil and fuel—easy on tires—the sterling material of which Dorts are built mean infrequent repairs and *slow depreciation*.

The watchword of the hour is "Make Every Dollar Count"—and in the purchase of a DORT, the fullest value is returned with interest.

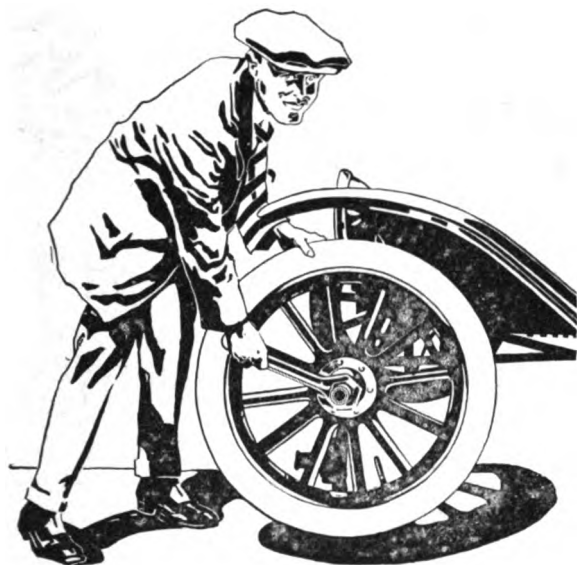
See the DORT models. Look them over carefully—compare. Then ask yourself squarely whether there are other values to equal them.

DORT MOTOR CAR CO. Flint, Mich.

Open Cars
Touring \$865
Roadster \$865

Fourseason Cars
Sedanet \$1000
Sedan \$1265
Coupe \$1265

(When Writing to Advertisers, Please Mention The Automobile Journal.)



"MINUTE" Demountable **WHEELS** for **FORD CARS**

*"One nut to unscrew
That's all you do."*

Substitutes road confidence for
puncture worry.

THE OUTFIT

One extra wheel interchangeable with any Ford Wheel, four "Minute" Hubs, Minute hub wrench, one extra flange.

THE ADVANTAGES

Shoes shifted in sixty seconds!
Tires changed by removing one large nut.
Damaged casings removed without soiling hands and clothes.
Wheels changed without effort—a woman can do it.
Less weight than demountable rims, and better balance—weight on hubs instead of rim.

THE PRICE

\$30.

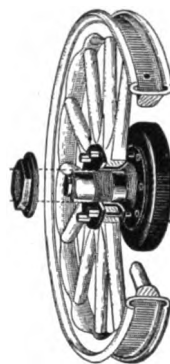
(Denver and West \$35.)

Dealers should send for illustrated booklet, describing in detail this time and temper-saving device.

We have a unique direct-by-mail advertising proposition which we offer free to dealers with their initial purchase.
Write for particulars.

Name _____

Address _____



HILL-SMITH METAL GOODS CO.

H-S Quality Repair Parts for Ford and Overland Cars

82 Brookline Ave.

BOSTON, MASS.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Announcing

Boston's Newest and Finest Storage Battery Service Station

The Pettingell-Andrews Company announce
to the Automobile Trade the opening of
their new up-town Automobile Division

100 Brookline Avenue

The facilities in this new station reach the
highest point of efficiency by the thorough
supervision of trained and broadened men

Exclusive New England Distributors of these Proven Products:

Eveready Storage Batteries.

Eveready Ford Electric Starters.

Eveready Mazda Automobile Lamps.

Genolite Ford 6-volt Lighting Systems.

Ford Speedereters (makes your Ford act like a six).

General Electric Tungar Rectifiers (Battery charging outfits).

Exemplar Automobile Polish, etc.

Automobile Division

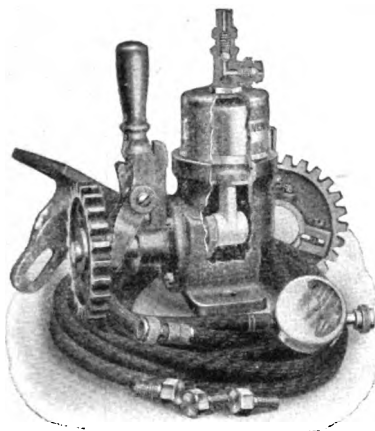
PETTINGELL - ANDREWS CO.

100 Brookline Avenue

Boston, Massachusetts



ENGINE DRIVEN TIRE PUMP



PRICE, COMPLETE

With hose, gauge and fittings

\$10.00

Does what no other pump can do. Because built as no other pump can be built.

Piston works through a Packing-Ring, reducing wear to the minimum. Beveled base of Ring shaves surplus oil off piston at every stroke. Permits ample lubrication, but prevents oil passing Ring.

Ring is endless. No gaps for air to leak out or oil to leak in. Can be instantly adjusted (by turning cylinder) to maintain air-tight, oil-proof fit, and insures 97% efficiency.

The high efficiency enables the CRANE to do the work of pumps twice its size, weight and parts. And small size, light weight, few parts and simplicity mean low production-cost.

That's why the CRANE sells for \$10 complete despite high-grade materials and finest workmanship.

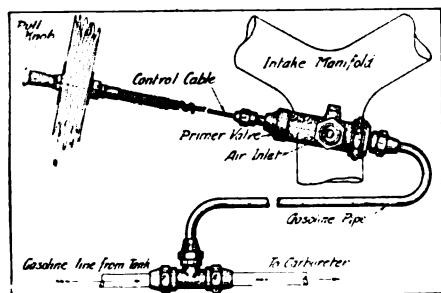


Crankshaft Driven Detachable Model

COPLEY PRIMER

(PATENT APPLIED FOR)

An Auxiliary Carburetor, guaranteed to start any motor on one turn in any weather and with any grade of gasoline



The Copley when attached becomes permanent equipment and can be installed in less than one hour. Automatically regulated, supplying gasoline and air in the right proportions and at great velocity, thus insuring a never failing highly explosive charge. Controlled from dash or instrument board.

Priming Charge Drawn In by Engine Suction

The Copley Primer stops the heavy drains on batteries and it is the greatest time, labor and back saving device that can be placed on any car.

Jobbers and Dealers. The Copley is the one practical and dependable primer. Send today for full information, advertising matter and discounts

List Price \$5.00

For Complete Outfit, including Primer Valve, Dash Control, Cable, Pipe and Pipe Tee. Everything necessary for attaching to car.

BAY STATE PUMP CO. 100 Purchase Street,
BOSTON, MASS.



Expert Service for all New England

THE need for dependable motor car service has many times been obvious to those who have experienced the "average" service of tinkering junior mechanics.

Motor Parts service is dependable—it is "expert" service, because only men who measure up to the MP standard of experience are allowed to perform the important work of adjusting, repairing and installing.

Thus, a force of experienced men, backed by a most modern shop and electrical laboratories, assure

Bosch Magnetos

Bosch Dynamos

Bosch Starting Motors

**Westinghouse Lighting
and Starting Systems
for Fords**

Zenith Carburetors

MP Cables

Spark Plugs

Wire Wheels

Brushes and Fuses

Ford Cable Sets

Auto Lamp

Etc., Etc.

To Motorists

dependable service in the repairing, adjusting or installing of the more important automotive accessories.

To the Trade

MP service acts in full co-operation with the trade. Your dealer can provide you with MP service. Merely ask him to send your apparatus to us for adjustment, repairs, etc.

We solicit the patronage of the nearby and distant dealers and the motoring public, owners of motor cars, motor trucks, motorcycles, etc.

May we send you our Service Booklet?

MOTOR PARTS COMPANY

**104 Brookline Avenue
BOSTON, MASS.**

**143 Chestnut Street
SPRINGFIELD, MASS.**

NEEDHAM TIRES



NEEDHAM pneumatic shoes are the best tire value money can buy. They are hand made and built with the wrapped two-cure process.

Service and satisfaction are in ratio to quality.

We are making agency contracts with dealers who specialize and sell absolutely the best.

**Needham
Tire Company,**
Charles River, Mass.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Come on Men 250,000 of You!

Launch a Blow at the Kaiser by Helping Launch a Ship

Who says we can't build ships!

Come on you loyal American Mechanics, masters of familiar trades, and brand this "made in Germany" insinuation by building a bridge of ships to Pershing.

You can't do your country a greater service than by exchanging your good American brawn and skill for good American dollars — in the shipyard. And you'll do as much to win the war as the men dependent upon you in the trenches. Ships, men, are the pivot on which the destiny of this country turns, and Uncle Sam is looking for 250,000 U. S. shipyard volunteers to build them.

Listen!

Every rivet driven in the shipyards brings us nearer to the successful termination of the war.

To do our fair share our shipbuilding program calls for 6,000,000 tons a year, or over a thousand ships. We must have them to win.

We must have them to keep the wheels of American industry moving and American labor employed in the factories.

The Shipping Board has the money, the materials and the yards to carry out this 6,000,000 ton program, but it needs men to assure these thousand yearly launchings which will hurl their tidal wave toward Germany. There must be an immense reserve of earnest skilled labor to draw

on as fast as plants are completed in the yards and housing provided.

This, then, is the purpose of this message—to ask your enrollment as a shipyard volunteer, for work in the shipyards when needed. Back up Uncle Sam and the millions of your brother workmen by your enrollment.

This does not mean that you are to give up your regular job and rush off to some shipyard which at the moment, may not be able to accommodate you. Quite the contrary! Your enrollment simply shows that you stand ready, when called upon, to do a particular job for a particular wage in a particular place. Everything will be in readiness for you, and you will lose no time.

And so highly does the Government think of your services that you are placed in a deferred class in the draft, as long as you are working

on ships. The War Department, by arrangement with the Emergency Fleet Corporation, accepts shipyard work as a substitute for military service. That's how important Uncle Sam considers ship building and the men engaged in it.

"But," you say, "I've never worked on shipbuilding."

That's exactly why Germany thinks that America cannot build ships. Germany knows



The Man of the Hour

that there are not enough men in America who have actually worked on ships to make more than a tenth of the ships we need if we are to do any fighting worth while.

Here is where you American workmen can fool the Kaiser.

Ships are not things of mystery; they are merely big buildings afloat—the product of everyday skill and industry—and the American Mechanic (hats off to him) can build them.

Familiar trades—your trade—are the ones that build ships; and almost all trades are represented. Two-thirds of the occupations used in shipbuilding are common to other industries, like boiler making, car building, bridge building, carpentering, machine shop work, etc. The list given later indicates some of the classes needed. Read it carefully and see how you qualify.

If you possess the right sort of training now is the time to rally around this movement and wear a Badge of Honor. This button, issued by the United States Shipping Board, shows that the

wearer, through enrollment in the United States Shipyard Volunteers, has placed the welfare of the Nation above all else and stands ready by his labor to help throw across the seas a bridge of ships by which the armies of the United States can pass to do their duty on the fields of France.

To wear this button is a sign of distinction. It truly stamps the owner as the man of the hour in whose hands rest the happiness and security of every man, woman and child in this country.

Come on men—250,000 of you! Your Government is asking that you answer the rattle of German machine guns with the rattle of the riveter. It is asking you, for the present, to prove that you are the marrow of Americanism by going on record with an expression of your willingness to help build ships where you are needed. And it meets you half-way with good

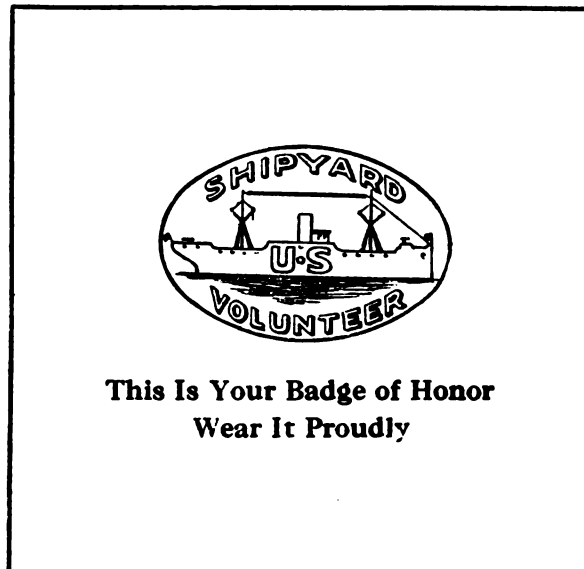
wages and deferred class in the draft with all honor.

Can you turn a deaf ear to the call? Where can you qualify in the following list?

Acetylene and electrical welders
Asbestos workers
Blacksmiths
Anglesmiths
Drop-forge men
Flange turners
Furnace men
Boiler makers
Riveters
Reamers
Carpenters
Ship carpenters
Dock builders

Chippers and calkers
Electrical workers
Electricians
Wiremen
Crane operators
Foundry workers
Laborers, all kinds
Loftsmen
Template makers
Machinists and machine hands, all sorts
Helpers
Painters

Plumbers and pipe fitters
Sheet-metal workers
Coppersmiths
Shipfitters
Structural iron workers
Riveters
Erectors
Bolters up
Other trades
Cementers
Crane men



**This Is Your Badge of Honor
Wear It Proudly**

Clip the Coupon and Get the Full Story

Edward N. Hurley, head of the United States Shipping Board, is the mouthpiece of Uncle Sam in this call for shipyard volunteers. He has complete information on hand, ready to mail you, regarding method of enrollment and other details you may want to know. The coupon below is here for your convenience in writing. Don't delay. Fill in the information asked for, clip and mail. Your action in this matter will bring you full particulars.

Show that you are interested by doing this now, while the coupon is before you.

Edward N. Hurley, Chairman,
U. S. Shipping Board,
Washington, D. C.

I wish you would send me at once further information, telling me how I can enroll as a member of the U. S. Shipyard Volunteers of the Public Service Reserve for employment in shipyards and so help win the war.

My Trade is.....
My Name is.....
Street Address.....
Town..... State.....

PAIGE

The Most Beautiful Car in America

"Barrage Fire"

To win this War we must have Team Work.

To sell motor cars this year you must have Team Work.

Without a big, powerful, well directed Company back of YOU this year, you can't make the Sales, though the Market and the Sales are here.

You must have a GOOD car to sell, a nationally popular car, a universally known car, a car that is known to be a sound investment, a car that will give service, a car that is economically maintained and requires the very minimum of repair. The American people in 1918 are going to buy cars liberally. With billions of dollars given to us to spend, with big crops, big business, plenty of work, we are going to be unprecedentedly prosperous. But the American people are going to buy intelligently.

You must sell the BEST CAR and SELL it.

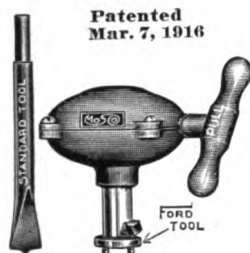
You must have ADVERTISING—not behind you—but ahead of you—Advertising is the barrage fire that clears your advance and prepares your way. You must have back of you a company that is already known to be impregnable in its resources, sound and conservative in its policies, liberal and loyal to its customers and its dealers. This year the Company back of the car is just as important to the buyer as the car itself. And it should be just as important to YOU.

You don't have to be told of the Gibraltar strength of the Paige-Detroit Motor Car Company, of its vast financial resources, of the sound principles that have brought overwhelming popularity and supremacy to its product.

Does the Paige not offer the sort of organization, of support, of business insurance, of TEAM WORK which you need in this War Year of 1918? We believe it does.

PAIGE-DETROIT MOTOR CAR COMPANY, DETROIT, MICH.

YOUR DEALER SELLS THEM



Patented
Mar. 7, 1916

The Mosco Valve Grinder

This tool differs radically from others in several respects. It is really more of a machine than a hand tool, as it renders valve grinding an accurate mechanical operation rather than a guesswork hand job.

It has been found that a much more rapid motion can be obtained with the Mosco Grinder than with the ordinary tool, resulting in a very superior finish on the seats.

The device is made of the best materials and is thoroughly guaranteed in every respect. At the low price at which it is listed there should be one in every kit, when it is considered that it is offered not only as a tool, but as a QUICKER, SAFER and BETTER METHOD of valve grinding.

PRICE \$1.75.

SIZE (IN CARTON), 3 1/4 x 6 1/4 x 3 1/2. WEIGHT, 30 OZ.
SHIPMENTS PACKED TO ORDER.

Mosco Socket Nut and Bolt Holder for Ford Car

A REAL TIME SAVING DEVICE. Takes the place of that other man whose help is usually required for this operation.

Simply slip MOSCO Nut and Bolt Holder over the top of each engine or Transmission nut or bolt head, the wings protruding above the hex socket engage wall of crank or transmission case and prevent nut or bolt head from turning while the man underneath the car unscrews the bolts.

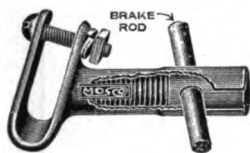
When replacing put head of bolt on top, slip on the MOSCO socket and proceed as in taking out.

Made of heavy pressed steel, with reinforced wings welded to body of socket. All case hardened and finished bright.

PRICE 15c EACH.

Mosco Brake Rod Guides for Ford Car

Will positively silence the objectionable rattle of the Ford brake rod, without impeding its full movement. The ends of these guides are provided with bayonet lock slots so they may be slipped over the brake rods without removing same from the car, also the slot is so designed that the rods cannot shake out. The grease cup prevents wear of the rods and permits easy action. Made of semi-steel and very easily applied.



PRICE, PLAIN, 40 CENTS PER PAIR.
PRICE, WITH GREASE CUP, 60 CENTS PER PAIR.

Mosco No. 200 Timer for Ford Car

The case is made of extra heavy pressed steel, finished in aluminum. Gray bone fibre is used for raceway, with steel inserts dovetailed in and all lathe finished to a polished surface. The threaded terminals are insulated by fibre washers all the way through to contact points, thus removing cause of short circuiting common to this style of Timer.



Patented Oct. 31, 1916

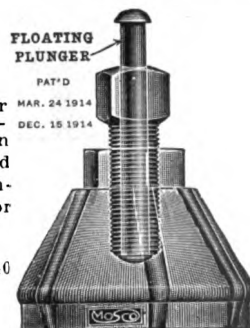
Price, complete with brush, \$1.50 each. Brush assembly only, \$0.40 each.



Mosco Floating Plunger Wheel Puller

Starts a "Frozen" or "Stuck" wheel instantly. Strike the plunger; turn the screw, strike again and the wheel comes off without injury to hub-threads, spokes or axle.

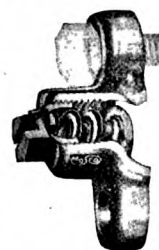
Made for 200 models of 40 popular cars.



Mosco Anti-Rattling Ball Socket for Steering Rod of Ford Car

AN ENTIRELY NEW DESIGN. For taking up the wear and eliminating the rattle on worn ball sockets on both ends of steering gear connecting rod. An occasional packing of hollow hex plug with grease insures proper lubrication, smoother working and reduces wear. Tension of flat spring, which is held in position by head of bolt, prevents the hex plug in end from unscrewing. Slotted in hex end so that adjustment can be made with screw driver or wrench. Made of high grade semi-steel.

PRICE 20 CENTS EACH.



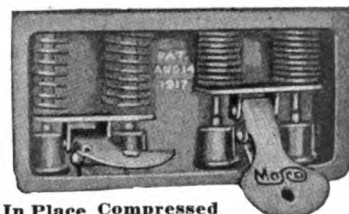
No. 2

Mosco Valve Spring Compressor for Ford Car

The use of the MOSCO Valve Spring Compressor eliminates what is usually a troublesome operation, viz., the compressing and replacing valve of springs. By using this simple device springs can remain in position until grinding of valves is completed.

It compresses two valve springs at one operation and permits removing of pins. Should the pins be crosswise turn valve around until they are in position to pass through slots in compressor. After grinding valves reverse above operation. Made of heavy pressed steel.

PRICE 50c EACH.

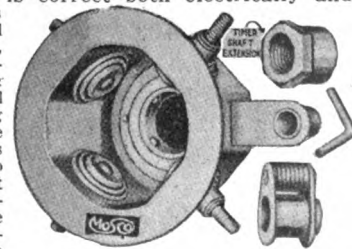


In Place Compressed

Improved Bemus Ball Contact Timer for Ford Car

The BEMUS is an IDEAL TIMER for the Ford high speed, short stroke engine, because form of contact is the only one which is correct both electrically and mechanically. This is made by a hardened tool-steel brush, mounted on eccentric cam, engaging spring-pressed steel balls with glancing impact, both the brush and the balls turning each time so that fresh contact surfaces are continually made. The brush comes in contact only with the four balls, touching no fibre or insulation.

MOUNTING is direct on the time shaft by means of an extension piece which is screw threaded on to shaft, and runs in ball bearing placed in recess of timer shell. This means that each of the balls is equi-distant from the brush. RESULT—absolute precision of timing.



SIZE (IN CARTON), 3 1/4 x 3 x 2. WEIGHT, 9 OZ.
PRICE \$2.25.



The "Mosco" Trade Mark is Your Guarantee of Quality
MOTOR SPECIALTIES COMPANY, WALTHAM, MASS.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

BOSTON AUTOMOBILE SHOW

March 2—9 (Inclusive)

Mechanics Building—Horticultural Hall

10 A. M. 10:30 P. M.

*The Boston Automobile Show This
Year Will Surpass Any Display
Ever Held in America*

With hardly an exception all types and models of passenger cars will be shown.

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Boston Commercial Motor Vehicle Association, Inc.*

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this will be the last war

If We Lose

—It will be but the beginning of wars upon wars, a holocaust with slaughter, famine and unspeakable horrors.

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31x4	.. 5.00 up	36x4	.. 7.75 up
32x3 1/2	.. 5.00 up	36x4 1/2	.. 8.00 up
32x4	.. 6.50 up	37x4 1/2	.. 8.00 up
33x4	.. 6.50 up	35x5	.. 8.50 up
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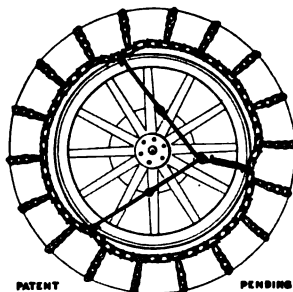
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32x3½ .. 5.00 & up	35x4½.. 8.00 & up
34x3½ .. 6.00 & up	36x4½.. 8.00 & up
31x4 .. 5.00 & up	37x4½.. 8.50 & up
32x4 .. 5.50 & up	35x5 .. 9.00 & up
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32x3	9.45	2.60		35x4	17.85	4.15	
28x3 1/2	9.95	2.80		36x4	18.35	3.90	
30x3 1/2	10.50	2.60		34x4 1/2	21.00	4.50	
31x3 1/2	11.00	2.80		35x4 1/2	21.50	4.65	
32x3 1/2	11.55	2.85		36x4 1/2	22.85	4.85	
34x3 1/2	12.85	3.50		37x4 1/2	23.10	5.00	
30x4	14.70	3.50		34x5	23.65	6.15	
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And other Electrical troubles on your Trucks by using

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Stanley Garage Hardware

MARCH means strong gales and its essential to have some positive means for holding the door open while your car is entering and leaving the garage.

That's why you need the Stanley Garage Door Holder. It's an arm of steel that automatically locks the door open. A pull on the chain permits the door to be swung shut.

You will be interested in all Stanley Garage Hardware Products—Stanley Latches, Pulls, Bolts, Butts and Hinges, because they are correctly designed: are made especially for garage use, and give perfect service.

Sold by all the leading hardware stores everywhere.

Write today for booklet "Y-3" on Stanley Garage Hardware. Sent free on request.

The Stanley Works

New Britain, Conn., U.S.A.

New York
100 Lafayette Street

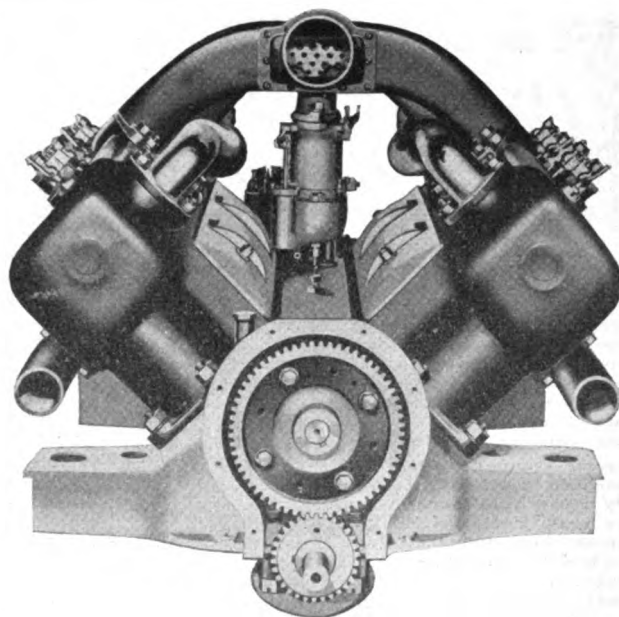
Chicago
73 East Lake Street

Manufacturers of Wrought Bronze and Wrought Steel Hinges and Butts of all kinds, including Stanley Ball Bearing Butts. Also Pulls, Brackets, Chest Handles, Peerless Storm Sash Hangers and Fasteners, Screen Window and Blind Trimmings, Furniture Hardware, Twin Rolled Box Stopping and Cold Rolled Stripped Steel.

Stanley Garage Hardware is adaptable for factory and mill doors.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Over 80 Parts Eliminated



HERE is one illustration of Apperson skill. It demonstrates the value of buying not only a car, but *experience*. The 25 years spent in building motor cars taught the Apperson Brothers how to eliminate over eighty parts from the eight cylinder motor. The Apperson Eight is the simplest of any now being built.

Only One Cam Shaft—Only Two Cam Gears

These are practical reasons for the extreme simplicity and quietness of the Apperson Eight motor.

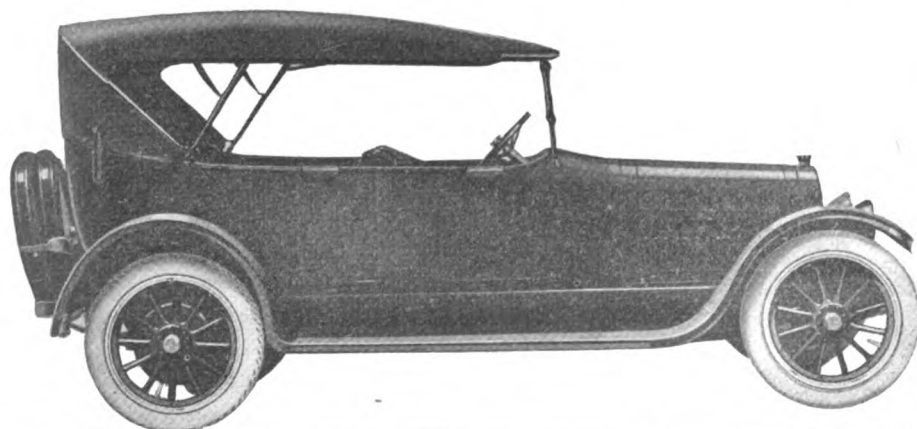
The hollow crank shaft, positive feed lubrication system, and the enclosed, yet accessible valves are among other desirable features that clinch sales with well informed motorists and contribute to the 100% performance of this Eight.

See the Apperson Eight motor—test it—watch its work on all kinds of roads and you'll decide that no other Eight can meet your needs as well as the Apperson.

Apperson motor cars are built in eights and sixes, touring cars and "Chummy" roadsters. Ask your dealer to explain—and demonstrate.

Apperson Brothers Automobile Company, Kokomo, Indiana

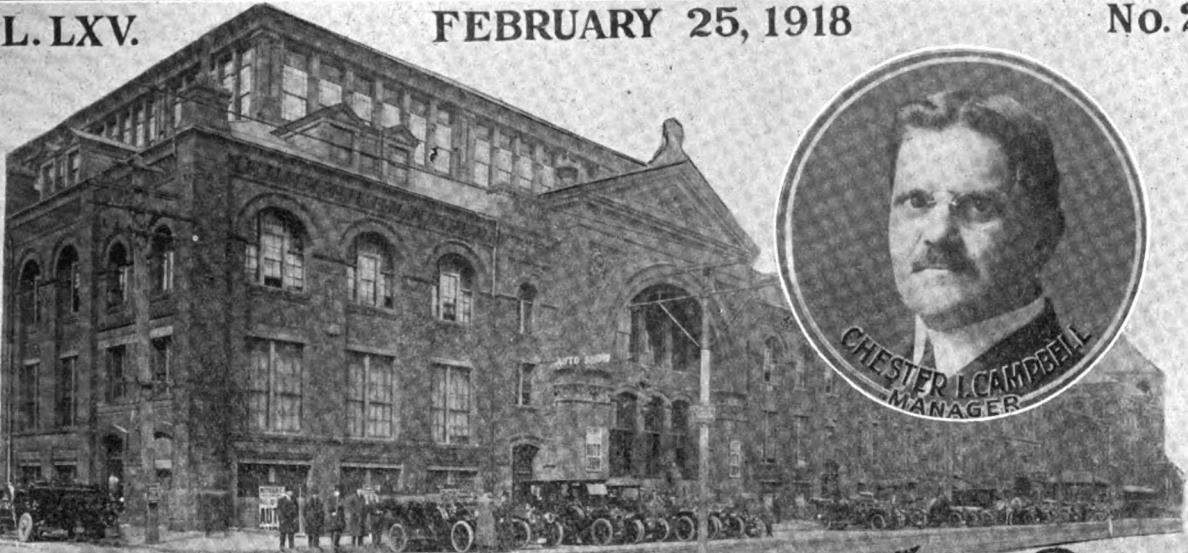
APPERSON 8



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The AUTOMOBILE JOURNAL

VOL. LXV. FEBRUARY 25, 1918 No. 2.



Boston Automobile Show
the worlds Greatest Exhibition
and Retail Car Market

Value of Exhibits \$1,500,000—364 Exhibitors

WHEN the Boston Automobile Show is announced annually the whole of New England, figuratively speaking, comes to attention, as it is the signal that the numerous products of the great motor car industry in their latest and improved form will be exhibited at the Mechanics' building under the auspices of the Boston Automobile Dealers' Association and the Boston Commercial Vehicle Association.

The Boston Show, which this year is being held during the week of March 2-9, in the Mechanics building, is the 16th annual exhibition and the largest in the world, as it includes exhibits of not only passenger cars, but also commercial vehicles and accessories on a large scale. This year's exhibits are valued at approximately \$1,500,000, and there are a total of 364 exhibitors, showing 80 different makes of cars, 52 makes of trucks and 222 accessory products. Over 460 cars, trucks and chassis are included in the exhibits.

Nowhere in the world is there gathered under one roof for exhibition

purposes such a comprehensive exposition of automobiles, parts and products of the motor car industry, and it is fitting that New England people should be afforded the opportunity of once a year of having such a show within the centre of their territory, as they consume fully one-tenth of the output of the industry under normal conditions. This fact, on the other hand, has made possible not only the stupendous show that is held each year in Boston, but also the extensive automobile distributing business with its large assembly, service and sales rooms housed in hundreds of large buildings scattered about the Hub.

Every type of automobile is found among the exhibits, including 77 gasoline models with engines of four to 12 cylinders, three electric models and one steam car. The price range on these models is from \$445 to \$7500.

It might be interesting to note, however, that despite the war conditions and the increase in prices during the past year the average price of the motor cars exhibited is \$100 less than it

was three years ago.

The Mechanics' building in fact during show week is transformed into a huge department store, catering exclusively to the wants of the public in every product of the industry from a complete limousine or truck down to a tire patch, and the service in this mammoth car emporium is excellent, as there are approximately 3500 salesmen in attendance. This is another feature in which the Boston show is without a peer, over \$4,000,000 worth of products having been disposed of during the seven days that it was opened last year. But the Boston show is more than a retail exhibition, it is the big trade show of the year, for the whole New England territory and many thousands of dealers, agents and representatives gather in the city during show week to look over the new products and discuss the outlook. In this respect the Boston show will be the liveliest in history, as hundreds of gatherings, dinners and get-together meetings are on the program. Years ago the show lost its local characterization, as many of the leading au-

tomobile officials from the great motor car manufacturing centres attended annually. This year, however, the show has received even greater recognition through the sanction of the Motor and Accessory Manufacturers' Association, which is an organization composed of the majority of the leading parts and accessory makers of the country. A large number of the members of this organization are exhibiting their products.

The setting for the show is beautiful and dazzling. The wealth of color and the maze of multicolored lights combining the highest possible art with the surroundings, appropriate both as a background as well as forming a beautiful decorative ensemble. The designer's subject for the 1918 show in the grand hall is described as a "Florentine fete."

The magnificent scenic work is the production of the leading men of the country from original designs. From the immense procenium arch and tormentors, the designer has worked out a beamed effect of the ceiling that is altogether different from anything previously attempted. All the details are in Florentine style and in wealth of color and technique are superior to the decorations that have gone before.

The balcony front presents a repeated design of Florentine carving in dull gold and base reliefs, between which are decorative lamps and garlands of the Italian order, backed by rich old rose fabrics. The rear balcony is rendered in a sloping garden effect, studded with rich green sward and bright floral beds.

On either side of the main aisles are bronze gates with semi-circular tops some 12 feet in height. All are in fret work of old bronze with beautifully modeled relief ornaments, flanked by corner posts, surmounted by lofty electroliers. The names of the exhibitors are inscribed on the portals. Between the gates the native trees of Sunny Italy stand out in full bloom.

Fountains will play in the centre of the main floor, while the stage front will be rendered in a style completely different from the former magnificent displays. The approach to the stage will be covered by a curved marquee of crystal and bronze effects, on the apex of which a splendidly modeled figure of "Hope" holds aloft with one hand the gleaming torch of inspiration, and with the other garlands of plenty. Six fountains in sculptured Florentine marble will border the front line of the stage, which is to be edged with trim box trees. A continuous line of electric and floral arches spanning the distance between the fountains enhances their effect.

There will also be a wealth of beautiful colorings used by the designer in Exhibition Hall. The warmth and beauty of the combination of colors will feature this section of the main aisle with its projecting fret work marquees, the transverse hangings in gold and colored lights, the scenic and sculptured wall panels and fine draperies give an effect and background rich and appropriate.

One of the most difficult portions of this hall, the light well, will be utilized



J. H. MacAlman, President of the Boston Automobile Dealers' Association.

to emphasize the title "The Hall of Color," for above the line of the balcony will be suspended a huge perforated ceiling of wrought iron fret work, each juncture accented by a prismatic electric ball, the ceiling divided up into panels and the connecting bars overrun with vines and delicate flowers. The face of the balcony will represent a carved stone balustrade, with trimmed hedge and trees and Roman vases filled with foliage.

The aisles will be crossed with elliptical vine clad arches and attractions in decorative effects well worthy of critical note. All stairways will receive particular attention this year, some treated with marble effect, others as garden entrances.

Owing to the remarkable strides toward perfection made in chassis design in the past few years, each succes-



J. S. Hathaway, President of the Boston Commercial Motor Vehicle Association.

sive year witnesses the introduction of fewer and fewer radical changes or innovations, with the result that the past 12 months has brought forth a smaller number of fundamental changes in construction than have ever before been incorporated in new models.

This season will be one in which the keynote might be said to rest mainly upon improvements, largely confined to refinements and appointments, and in this respect the evolution of the motor car as indicated by the 1918 models is very remarkable.

Under the head of refinements so far as the chassis is concerned may be included primarily the improvements in carburetion methods, as this is the most important factor in motoring, as it promotes efficient and economical engine operation.

To obtain more efficient carburetion and greater mileage per gallon, many makers have adopted heaters for the carburetor supply or intake manifold, insuring better vaporization of the fuel, with consequent improved combustion and greater development of power. The heat is applied in various ways, some using electric coils, others devices that take the heat from the exhaust, and there are a large number of engines so equipped.

Along similar lines of conservation, makers have adopted new means of conserving the power once it is generated and have adopted devices for regulating the cooling system, so that engine temperatures are approximated more nearly to ideal operating temperatures. On a number of cars thermostats are installed in the water pipes to slow down the circulation with the object of raising the temperatures, and on others shutters are placed in front of the radiator, serving a similar purpose, but in a different way.

There are also fan regulators through which the speed of the fan can be accelerated when it becomes necessary to reduce the temperature of the water, while some models are equipped with pump circulation systems which operate only when the water is hot.

These devices, now coming into general use, while seemingly of minor importance, are looked upon by experts as the most advanced strides in practical development that have been made since the motor car was introduced, as they make for general improvement in engine efficiency, as well as economy of fuels and lubricants.

Externally, the motor car of this season does not present any conspicuous changes to the eye at first glance, although as in the past numerous refinements have been made that while not altering the general body lines have produced greater comfort for the passengers and made more convenient the operation of the various devices for operating the car.

In the great variety of cars and products in the Mechanics' building is represented the great silent factor that will be more instrumental in winning the war than any other invention or discovery.

Motor Cars and Trucks at Boston Show

PASSENGER CAR EXHIBITORS.

The street addresses of the following exhibitors are all located within the city of Boston, except in cases where they are otherwise stated:

Car	Dealer	Space
Allen, John L. Judd Co., 685 Beacon St.		426
American Six, Smith Co., Fred S., 749 Boylston St.		3
Apperson, Apperson Car Co. of N. E., 739 Boylston St.		112
Auburn, John L. Judd Co., 685 Beacon St.		426
Briscoe, N. E. Velle Co., 80 Brookline Ave.		146
Buick, Buick Boston Co., 97 Massachusetts Ave.		140-144 Inc.
Cadillac, Cadillac Auto Co. of Boston, 664 Commonwealth Ave.		2
Case, Eastern Motor Sales Co., 823 Boylston St.		150
Chalmers, Chalmers Motor Co. of N. E., Inc., 620 Commonwealth Ave.		118
Chandler, Chandler Motors of N. E., Inc., 714 Beacon St.		122a-123-124
Chevrolet, Chevrolet Motor Co. of N. E., 27 Huntington Ave.		115-116
Cole "8," Smith & Sons Co., B. G., 661 Beacon St.		36
Commonwealth, Carter, Crane Co., 1358 Commonwealth Ave.		427a
Crane-Simplex, Canterbury, Inc., G. W., 733 Boylston St.		24-25
Cunningham-Cunningham Son & Co., Jas., 1117 Commonwealth Ave.		137
Daniels "8," J. W. Bowman Co., 91 Massachusetts Ave.		5-9
Detroit Electric, E. Y. Stimpson, 530 Commonwealth Ave.		104
Dodge Brothers, Henshaw Motor Co., 915-921 Boylston St.		108-109
Dort, Utterback-Gleason Co., 737 Boylston St.	Dort Hall "G"	
Elcar, King Motors, Inc., 650 Beacon St.		30-31
Elgin "6," Smith & Sons Co., B. G., 661 Beacon St.		37
Empire, Dutton Motor Co., F. A., Somerville, Mass.		428
Fiat, Fiat Motor Sales Co. of N. E., 839 Boylston St.		113-114
Ford, Ford Motor Co., 96 Brookline Ave.		134-135-136
Franklin, Franklin Motor Car Co., 616 Commonwealth Ave.		121b-127a-128
Grant, Grant Motor Sales Co., 715 Beacon St.		424
Haynes, Russell Co., W. L. Motor Mart, Park Sq.		28
Holmes, Canterbury, Inc., G. W., 733 Boylston St.		24-25
Hudson, Henley-Kimball Co., 652 Beacon St.		125-126-127b
Hupmobile, Atlantic Auto Co., 574 Commonwealth Ave.		147
Jackson, Jackson Motor Car Co. of N. E., 1109 Commonwealth Ave.		34-35
Jordan, Hinchcliff Motor Co., 940 Commonwealth Ave.		100-101
King, King Motors, Inc., 650 Beacon St.		30-31
Kissel, Hinchcliff Motor Co., 940 Commonwealth Ave.		100-101
Liberty, J. H. MacAlman, 96 Massachusetts Ave.		15-19
Locomobile, Locomobile Co. of America, 700 Commonwealth Ave.		13-17
Marmon, Wing Motor Car Co., F. E., 562 Commonwealth Ave.		8-12
Maxwell, C. E. Fay Co., 1108 Commonwealth Ave.		117-132
McFarlan, Frank P. Anthony, 132-138 Worcester St.		150
Mercer, Fred S. Smith Co., 749 Boylston St.		3
Mitchell, Mitchell-Lucas Motor Co., 591 Boylston St.	Paul Revere Hall	
Monroe, Middlesex Motor Car Co., 709 Beacon St.		425
Moon, Middlesex Motor Car Co., 709 Beacon St.		425
Murray, Carter, Crane Co., 1358 Commonwealth Ave.		427b
Nash, Rockwell, Inc., C. P., 640 Commonwealth Ave.		105-106-107
National, Hart Co., A. T., 661 Beacon St.		26-27-28
Oakland, Oakland Motor Co. of N. E., 655 Beacon St.		148-149
Oldsmobile, Oldsmobile Co. of N. E., 916 Commonwealth Ave.		139-145
Overland, Connel & McCone Co., 533 Commonwealth Ave.		129-130-131
Owen Magnetic, 895 Boylston St.		4
Packard, Packard Motor Car Co. of Boston, 1089 Commonwealth Ave.		1
Paige, Paige Detroit Co. of N. E., 532 Commonwealth Ave.		138
Peerless, Beacon Motor Car Co., 660 Beacon St.		14-18
Pierce-Arrow, Maguire Co., J. W., 745 Boylston St.		16-20
Premier, Brown, Inc., Frank T., 753 Boylston St.		32
Rauch & Lang Electric, N. Rommelfanger, 398 Newbury St.		133
Reo, Linscott Motor Co., 566 Commonwealth Ave.		119-120-329-332 Inc.
Roamer, Morse & Co., Alfred Cutler, 705 Beacon St.		102-103
Saxon, Saxon Motor Car Corp., Detroit, Mich.		29
Scripps-Booth, Scripps-Booth Car Co., 5 Brighton Ave.		33
Stanley, Stanley Motor Carriage Co., Newton, Mass.		21
Standard "8," Standard Steel Motor Car Co., 1110 Boylston St.		121-122b
Stearns-Knight, J. H. McAlman, 96 Massachusetts Ave.		15-19
Studebaker, Donovan Motor Car Co., 626 Commonwealth Ave.		110-111
Stutz, Becker-Stutz Auto Co., 677 Beacon St.		22-23
Velle, N. E. Velle Co., 80 Brookline Ave.		146
Westcott, Morse & Co., Alfred Cutler, 705 Beacon St.		102-103
White, White Co., 980 Commonwealth Ave.		7-11
Willys-Knight, Connel & McKone Co., 533 Commonwealth Ave.		129-130-131
Winton, The Winton Co., 674 Commonwealth Ave.		6-10

TRUCK EXHIBITORS.

	Space
Acason trucks and chassis, Acason Motor Truck Co., Detroit, Mich.	354-5
Amesbury Internal Gear, Jackson Motor Car Co., Boston.	213-4
Atlantic trucks (electric) Day Baker Motor Truck Co., Boston	308-9-10
Atlas trucks, Signal Motor Truck Co. of New England, Boston, Mass.	203
Autocar trucks and chassis, Autocar Sales and Service Co., Boston, Mass.	316-17-20-21
Bethlehem trucks, C. S. Ransom, Inc., Boston, Mass.	347-8-9
Brockway trucks and chassis, Brockway Motor Sales Co. of New England	209
Chevrolet trucks, Chevrolet Motors of New England, Inc.	306
Clydesdale trucks, Oakland Motor Co. of New England.	324-5
Columbia tractors and trailers, John L. Judd, Boston.	225-232
Comdelcar, Longford Co. of America, Cambridge, Mass.	356-7
Couple-Gear, Couple Gear Freight Wheel Co., Grand Rapids, Mich.	307
Cunningham trucks, James Cunningham Son & Co., Boston	311-12
Day-Elder trucks, Day-Elder Motors Corp., Boston.	206-7
Denby trucks, Hurley-Kimball Co., Boston.	351-2-3
Dodge trucks, Henshaw Motor Co., Boston.	225
Diamond T trucks, Eastern Motor Sales Co., Boston.	303-4
Duplex trucks, Linscott Motor Co., Boston.	329-30-1-2
Ford trucks, Ford Motor Co., Boston.	350
F-W-D trucks, Geo. W. McBride & Co., Inc., Boston.	301-2
Federal trucks, Federal Motor Truck Co., Boston.	315-19
Fulton trucks, Jackson Motor Car Co., Boston.	213-4
Guaranty trucks, Guaranty Motors Co., Cambridge, Mass.	239
GMC trucks, General Motors Truck Co., Boston.	217-8-9-20-1
G-V trucks, General Vehicle Co., Inc., Boston.	323
G-V Mercedes, General Vehicle Co., Inc., Boston.	323
Hercules trucks, Stegeman Six Truck Co. of New York.	239
Hunt Industrial trucks, Day Baker Motor Truck Co., Boston	308-9-10
Hurlburt trucks, Day Baker Motor Truck Co., Boston	308-9-10
Indiana trucks, Indiana Truck Corp., Boston.	211-2
IHC trucks, International Harvester Co. of America, Boston	215-6
Kelly-Springfield trucks, Kelly-Springfield Motor Truck Co., Boston	313-4
Longford Units, Longford Co. of America, Cambridge, Mass.	356-7
Maxwell trucks, Charles E. Fay Co., Boston.	334-5-44-5
Mack trucks, Mack Motor Truck Co., Boston.	240-1
Maxim fire apparatus, Maxim Motor Co., Middleboro, Mass.	242-3-4
Maxfer trucks, Eastern Motor Sales Co., Boston.	303-4
Nash trucks, C. P. Rockwell, Inc., Boston.	327-8
Netco trucks, New England Truck Co., Fitchburg, Mass.	305
Packard trucks, Packard Motor Car Co. of Boston	336-7-8-9-40-1-2-3
Pierce-Arrow trucks, J. W. Maguire Co., Boston.	245-6-7-8-9-50
Phenix Unit, George W. McBride & Co., Inc., Boston.	301-2
Rainier trucks, New England Velle Co., Boston.	326
Reo trucks, Linscott Motor Co., Boston.	329-30-1-2
Republic trucks, Republic Truck Co. of Boston.	223-233-4
Sanford trucks, Sanford Motor Truck Co., Syracuse, N. Y.	202a
Signal trucks, Signal Motor Truck Co. of New England, Boston	203
Smith Form-a-Truck units, John L. Judd, Boston.	225-32
Sterling trucks, Sterling Motor Truck Co. of Boston.	201
Stewart trucks, H. Ross Maddocks Co., Boston.	318-9-20-12
Tonford Units, Eastern Motor Sales Co., Boston.	303-4
Troy trailers, Linscott Motor Co., Boston.	329-30-1-2
Truxton Units, C. S. Ransom, Inc., Boston.	347-8-9
Velle trucks, New England Velle Co., Boston.	326
Vim trucks, Merchants Motors, Inc., Boston.	236-300
White trucks, White Co., Boston.	251-2-3-226-7-8-9-30-1
Will Holl-Ton units, O'Lalor Auto Co., Boston.	200
Wilson trucks, J. C. Wilson Co., Detroit, Mich.	237-8
Avery tractors, Brackett, Shaw & Lunt Co., Boston.	346
Beeman Garden tractors, Brackett, Shaw & Lunt Co., Boston	346
Harley-Davidson motorcycles, Sanford Motor Truck Co.	202a

Other exhibitors in the truck department, the nature of whose displays have not been stated, are:

George M. Proctor, Boston.	208
Virgil White, West Ossipee, N. H.	210

Among other exhibitors the Eastern Motor Sales Co., Boston, Case farm tractors at spaces 303-4; L. M. Cotton, Inc., special bodies at spaces 359-62 inclusive; the Sewell Cushion Wheel Co., space 222; the Springfield Commercial Body Co. at space 346, and the Smith Wheel, Inc., at 204-5.

New Devices for Economy and Convenience

Lock On Marmon

In the new series Marmon 34 a number of features have been incorporated that will appeal to the experienced motorist, while it has no radical changes from the former models. It is equipped with a special locking device, an exclusive Marmon invention, which holds the gear shift lever in neutral. At the top of the ball on the upper end of the gear shifting lever is a Yale lock and when the key is turned in this and removed the car is about as safe as any lock can make it. The locking device is so arranged that the lock cannot be secured in any position except neutral. The same key that fits this lock also fits a lock on the hinged tool shelf in the left front door, and in the case of the roadster it also fits the lock of the spare compartment at the rear of the body.

A muffler cut-out that cannot be operated from the driving compartment is also a new feature on the Marmon. This provides a cut-out for any necessary motor inspection, but removes temptation to needless and annoying use of the device. The experienced motorist rarely uses the cut-out as he knows that the old theory that the muffler cuts down power has little substantiation in the case of the increased efficiency of the modern silencer.

The new series body lines have been developed, the rear seat of the touring car enlarged and deepened, the windshield tilted slightly, but most of the improvements about the series are of a detail nature and a few minor mechanical developments of more interest to the technical man or engineer rather than to the average motorist. The Marmon 34 retains its light weight features and is over half a ton lighter than comparable cars of similar power and wheelbase.

Scripps-Booth "Six"

A Scripps-Booth Six has been completed—six-cylinder construction marking an important change in mechanical features since Scripps-Booth corporation has heretofore confined their product to four and eight-cylinder cars. Another departure has been made by quitting manufacture exclusively of roadsters and adding a full five-passenger car of their other models, thus giving the line a universality of sale and utilitarian value not previously possessed. The new six-39 full five-passenger and six-40 three-passenger roadster will continue the distinctive character for the Scripps-Booth design.

On account of its increased power and efficiency the valve-in-head type of motor is continued in the six as in the fours and eights and only standard mechanical units of well proven character are used throughout models G and H roadsters.



J. W. Maguire, Distributor of Pierce-Arrow Cars in Boston.

The Pierce-Arrow

Pierce-Arrow cars, which for years have been recognized as the highest standard of workmanship in automobile products, both as to mechanical detail, as well as coach work, are little changed in appearance, yet there are incorporated in the new models no less than 135 improvements of an important nature which have been worked out and adopted during the past year. These include an enlarged braking area on the brake drums, a new universal joint, an added grease cup on the top half of the rear spring seat, a change in the lower throttle lever for foot accelerator to give a slower first opening, a new brace for the columns on runabouts, a longer water jacket, thermostatic water control and improved radiator, an oil gauge registering 100 pounds instead of 50, as was formerly used; a new hood catch, a metal rest for hood when raised, a new rear tire carrier ring type, new straight side tires, a new clock, a new plate glass window in rear of cape top and a projecting instrument plate. Numerous other refinements of a minor nature have been adopted which were considered essential to keep the Pierce-Arrow ahead of the times and afford users every possible advantage and convenience obtainable through improvements, the value and utility of which have been tested and proven.

It is a Pierce-Arrow policy not only to meet the most exacting requirements of the public as to performance and stability in its products, but also to cater to the discriminating taste of the public as to body styles, no less than 27 distinctive different types being included in the line. There are five different touring bodies, four runabout styles, six landaulet types, four brougham models, four coupes, a sedan, roadster and convertible roadster. Prices on these models range from \$4800 to \$6600.

Third Series Packard

A simplicity that emphasizes the real nature of the high class motor carriage as a utility of the first order, and at the same time fashions it along lines of lasting beauty, marks the design of the third series Packard Twin Six.

Particularly in the enclosed styles, which suggest year round use of the car is this note in evidence. The upholstery is strictly tailored. The detailed appointments are in authentic taste. There is an absence of ornamentation that suits the spirit of the times.

In both open and enclosed cars of the third series Twin Six line, that attention to the basic qualities of safety, durability and economy which has made a large part of the Packard reputation is noted in its highest expression. The prime consideration of the designers and builders evidently has been to supply the owner with a car that will give the maximum of service, one that will stand up and keep its style. Therein is real economy.

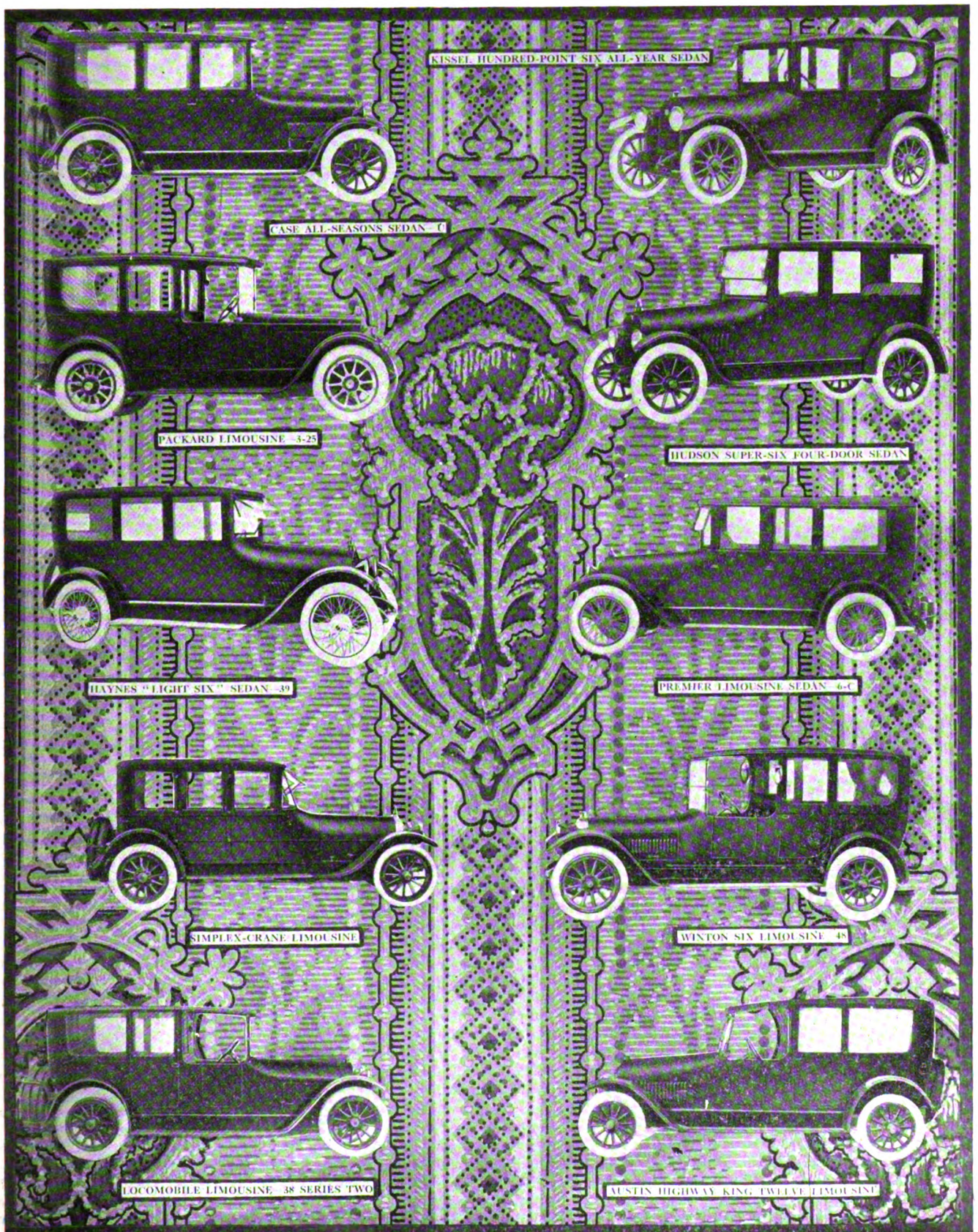
The refinements in the Twin Six power plant in the new model are addressed to the same end. They include an improved channeling of the gas passages, insuring an even more efficient distribution of fuel, with a consequent gain in power and economy. The remarkable facility with which the second series Twin Six operated on the low gravity gasoline generally marketed is even more noticeable in the new car, as shown by reports from owners who have had the third Twin Six in service for three or four months.

The control of the car has been simplified. A clean steering column, set at a smart angle, is achieved by dispensing with the control board. Ignition and lighting switches, the hand pressure pump and the gas mixture regulator are set conveniently on the cowl board. All dials are in the direct line of vision, and all switches ready to hand. The gear shifting lever is in the central position and is so arranged that it does not block the passage to the driver's seat.

A very distinct element of Packard attractiveness this season is its new line—a long, low, free flowing line, which the designers call "the fuselage." The radiator is higher and narrower. Its curving top breaks crisply into the beveled shoulders familiar in the Packard design. These beveled planes run a narrowing course until the cowl having been refined into an agreeable continuation of the bonnet, the radiator lines merge into the cap molding of the car. The slope of a form fitting windshield intersects at a catchy angle. The total effect is one of smartness and grace.

Among the advanced features of body design are the straight line roofs, which distinguish the enclosed cars.

Cars DeLuxe—The Majestic Limousine



Lower and Smoother Body Lines Shown

"Essex" Leads Paige

The "Essex Six 55," is the leader of the 1918 line of Paige cars made by the Paige-Detroit Motor Car Co. of Detroit, Mich. The feature of this new model is in the body design, beautiful and distinctive lines having been obtained through a gracefully rounded back. It also permits of a unique construction of the upholstery that has added to the riding qualities and comfort of the passengers. The top of the front and rear seats have been lowered to improve the appearance of the car, while the new shape of the rear end gives it more seat spring for the seat back.

In place of the old type coil springs the Paige Marshall spring is being used, which consists of small springs, about $1\frac{1}{4}$ inches in diameter, enclosed separately in canvas pockets. These are in turn assembled together in a frame construction to make up the seat and seat back. This type of spring conforms to the shape of the body and is much more comfortable than the old style, and it is claimed, holds the cushions in shape a longer while than any other type.

With the change in the shape of the body it became necessary to move the gasoline tank filler and gauge to the rear of the tank to facilitate filling the tank. Instead of supporting the tank on three bands as formerly, the tank on the 6-55 model is supported by pressed steel angles riveted to the heads of the tank and fastened to the bottom flanges of the frame. The capacity of the tank has been increased to 23 gallons.

Full crowned one-piece fenders have been adopted on the new Paige models and they have been brought down further at the rear end. The apron on the front fenders has been given a curved shape instead of being reinforced by ribs pressed in the metal. These changes were made to eliminate all rattles and to prevent mud splashing over and around the fenders.

Mechanically there are a number of changes. The cylinders of model 6-55 have been redesigned and several improvements made over the 6-51 design. Changes have also been made in the shape of the head of the combustion chamber. The intake manifold has been changed so as to give a uniform flow of gas of the proper mixture to each individual cylinder.

The manufacturers consider that the biggest improvement in Paige motors, models 6-40 and 6-55, this year, is the Paige automatic valve cleaning and polishing device, designed to eliminate the warping, pitting and regrinding of poppet valves such as used in internal combustion engines. It is a simple device and consists of an adjustable spacer, which can be locked after it is adjusted. It is placed at the lower end of the valve stem and by so doing the friction is removed from the valve the minute it leaves its seat, allowing the valve to float and be



Frank W. Wing, Marmon Distributor in New England.

free to turn under the turning action of the coils of the valve springs when they are being compressed and released.

In the model 6-55 the crankshaft has been increased in size. The pin bearings have been increased three-eighths of an inch in diameter and the main bearings one-eighth in diameter. The crankshaft cheeks are of massive construction, tending to eliminate all vibration.

A new transmission lock, new clutch improved crank case and transmission gearset are other features that are found in the new model, together with many other improvements and refinements that were quickly adopted by the Paige engineers when they had demonstrated their superiority over the parts formerly used.

New Allen Control

The Allen Motor Co., Fostoria, O., in its line of new models has confined its production to three types, a five-passenger touring car, four-passenger roadster and sedan, all on the same chassis, which has a wheelbase of 112 inches and is powered by a 35 horsepower engine, giving ample range of speed and reserve power for any requirement.

Among the numerous improvements in the new "Series 41," as the new models are designated, are those adding to convenience and ease of control.

A rotary switch on the steering column just below the 17-inch corrugated wheel controls the entire electric system. By a simple movement, like turning a door knob, the lights can be turned on, dimmed or turned off. Slight pressure on the side of the knob blows the horn and a little nickel button towards the driver controls the ignition.

The whole rotary switch can be locked with a small key of the Yale type. It is not necessary to reach over to the instrument board for anything except the carburetor choke, which is seldom used.

Gear shifting, hand brake and foot levers are placed conveniently and work easily. A foot arch support is applied for the plunger type accelerator pedal. The instrument board is of black walnut and mounts a Stewart speedometer, ammeter, carburetor air control, automatic ignition indicator and hooded electric lamp, all placed in positions for convenience.

A slanting windshield is another Allen innovation and has added greatly to its appearance. Particular attention has always been paid to the finish of Allen bodies, which have deep, luxurious colors, that keep new through long periods of service.

Grant Refinements

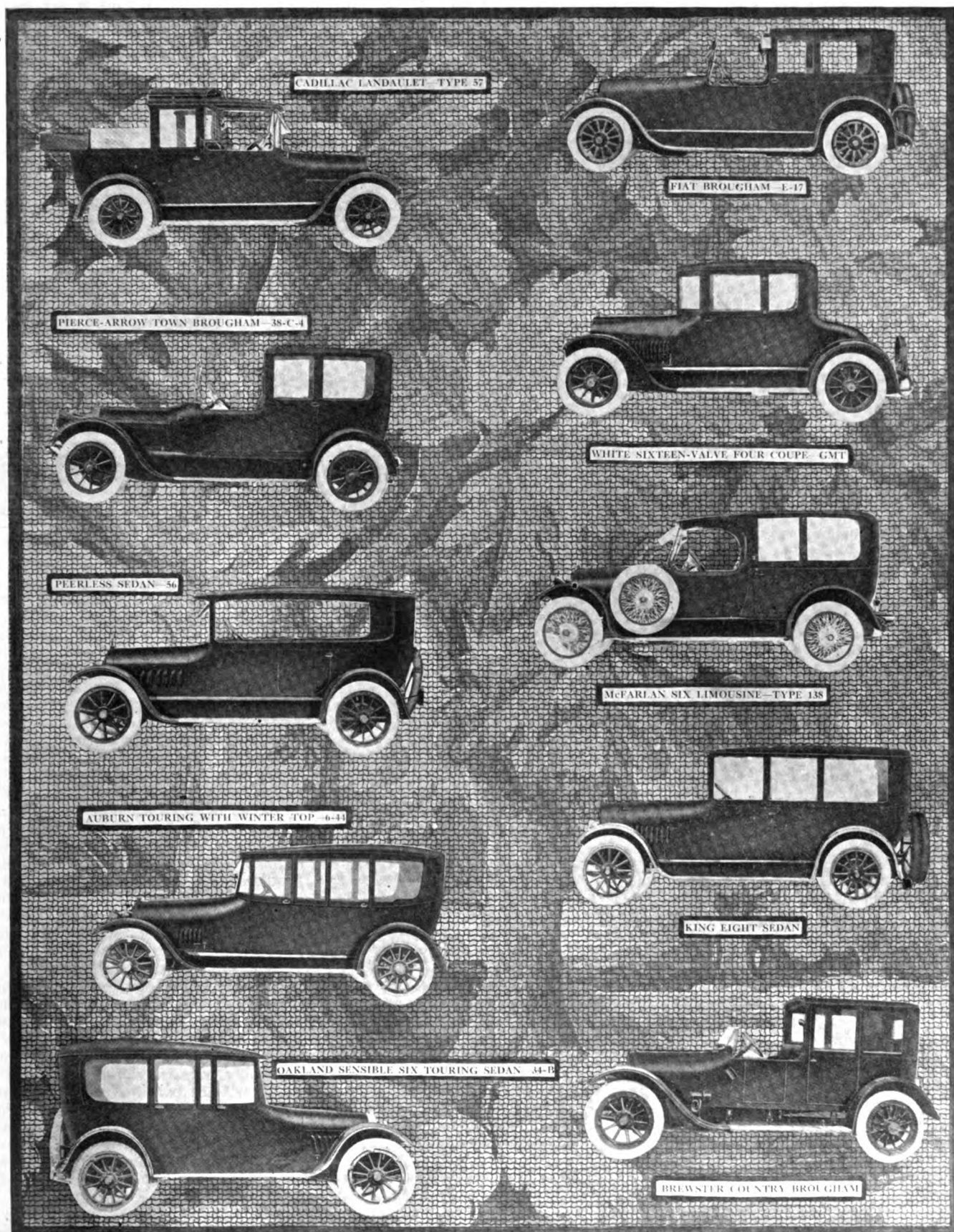
The new Grant Six is a larger car than the preceding models and incorporates extensive refinements both in chassis and body. The pronounced change in the appearance of the 1918 model is in the front of the car. A new high and narrow radiator with nickel trimming, new mounting of the lamps and new fenders and splashers have radically changed the front of the car. The wheelbase has been increased to 114 inches. The high radiator and hood, sloping windshield and the low cut body, wide doors and long running board combine to accentuate the length of the car and to give it grace and trimness.

Other body changes are the use of individual and adjustable front seats, double deck spring cushions, flat French plait upholstery and leather hand flaps on doors. The six-cylinder overhead valve type engine is continued in model G. It has $3\frac{1}{4}$ inch bore and stroke and piston displacement of 180.2 cubic inches. However, the new engine has balanced crankshaft and forced feed oiling and all bearings have been increased in size. The use of a sod pan has been eliminated. The motor is now protected from dust and dirt by metal parts reaching from the engine to the frame. Unlike the previous model, in the new model the Bendix pinion, flywheel starting gear, clutch and clutch throw out are completely housed. Rémy ignition, Wagner two-unit starting and lighting system, Willard Storage Battery and Stromberg carburetor are continued in model G.

The rear axle is of full floating type with 12-inch equalized brakes. In the model G, semi-elliptic springs are used in front and cantilever springs in the rear. However, the rear springs have been increased from 38 to 46 inches in length. Firestone demountable rims with $32\frac{1}{2}$ -inch tires are continued.

The five body styles include five-passenger touring car and three-passenger roadster, five-passenger detachable sedan, three-passenger convertible coupe and five-passenger convertible sedan. The latter body styles are new this year.

The Sedan, Coupe, Brougham and Landaulet



Fisk Rubber Co. Nearly Doubles Its Earnings

Net Profits \$3,578,484, as Compared with \$1,836,829 in 1916. J. D. Anderson Elected Vice President.

The Fisk Rubber Company, Chicopee Falls, Mass., fifth annual report for the year ending Dec. 31, 1917, shows net profits of \$3,578,484.57. This nearly doubles the amount for the previous year of \$1,836,829.86. J. D. Anderson, factory manager, was elected a vice president at the meeting. The present board and officers were re-elected with that addition. Since 1915 Mr. Anderson has been a member of the Fisk organization, assuming the position of sales manager. In March, 1916, he became factory manager, which position he still retains. He is one of the oldest rubber men in point of service in the country, having originally been connected with the Hartford Rubber Works, a branch of the United States Tire Co., since 1895. He was secretary of that company first and finally became its president. In the reorganization of the United States Tire Company, when the Hartford rubber works was consolidated, he was made general sales manager and in that capacity he supervised the large organization and traveled throughout the United States and Europe.

MOTOR PARTS CO. HAS NEW SERVICE AND SALES DEPOT.

The Motor Parts Co., with stations at 847-9 North Broad street, Philadelphia, Pa.; 104-6 Brookline avenue, Boston; 1789 Broadway, New York, N. Y.; 1064-6 Main street, Buffalo and 143 Chestnut street, Springfield, Mass., has recently occupied new buildings at Philadelphia and Boston, which afford very much improved and increased facilities, so that it can now serve its customers more rapidly and efficiently, both with reference to distribution of specialties and owner's service.

The company has expanded largely within a comparatively short time and it is now one of the best known and most progressive concerns specializing service and distributing equipment. The company originated in Philadelphia in 1911 and six years ago established a branch in Boston, later on locating branches at Buffalo and Springfield, and still more recently establishing itself in New York. The company first specialized service and maintenance of Bosch ignition systems, and this eventually to distributing Bosch products, and to this was added from time to time other auxiliaries and accessories for power vehicle use.

The object of the company was to afford a very high character of service, and as the distribution of different equipment was begun sub-stations were estab-

lished with agencies, which extended this service. Today the operations of the company through its own stations and branches and agencies cover large zones. For instance, the Philadelphia station, which is the location of the main offices, serves a considerable section of Eastern Pennsylvania, New Jersey, Delaware and Maryland; the Boston and Springfield branches serve all New England, the Buffalo branch a large area of Western New York, and it is about to take over the New York City service station of the Bosch Magneto Co., which will cover the metropolis and practically all the territory uncovered by the Philadelphia and Boston branches.

The new building in Boston is three stories and basement, 48 by 110 feet, and the company is at present occupying the first floor and basement, the street floor being the show room, stock room, offices and general repair shop, and the basement is given over to car service and installation, to battery service and main-



J. D. Anderson, New Vice President of the Fisk Rubber Co.

tenance and to repairing. The structure has just been completed, is ideally located, is fireproof and has been fitted expressly to meet the requirements of the company. It is adapted for large expansion and the facilities can be increased as needed. The equipment is with reference to affording quick and high grade service, and following the general policy of the company the workers are specialists, qualified to do work that will equal factory production and restoration.

The new building at Philadelphia is three stories and basement, having floor area of approximately 25,000 square feet, and is departmentized and equipped with facilities for distribution and service.

The Boston branch was located previously at 185-7 Columbus avenue, having space on two floors, and in the present building has about four times the space. The Boston branch is the New England distributor and service station for all Bosch products—magnetos, dyna-

mos and starting motors—Zenith carburetors, Westinghouse-Ford starting systems, Norma ball bearings, Mosler spark plugs, Solar automobile lamps, MP cable for starting and lighting systems and ignition systems, and it is general distributor for Federal Mazda lamps, starting motor and generator brushes, fuses, etc. The branch repairs, adjusts and installs Bosch magnetos, dynamos and starting motors, Westinghouse-Ford starters, Zenith carburetors and storage batteries. The shops are prepared to do work on any make of electrical apparatus or systems.

The Philadelphia headquarters and the other branches distribute and afford service for Bosch systems and other equipment in the same manner and to the same policies, and the general satisfaction obtaining is best demonstrated by the very large expansion necessary in the two stations specifically referred to in this statement.

Du Pont De Nemours Co. Earned Over \$48,000,000

Sixteen Per Cent. Earned on \$200,000,000 Capitalization as Against 11½ Per Cent. on \$51,500,000 Before War.

The annual report of E. I. Du Pont de Nemours & Co., Wilmington, Del., shows profits last year of \$48,112,952.65, or 16 per cent. on the \$240,000,000 capital employed, against 11½ per cent. on the \$51,500,000 of capital prior to the war. The profits for 1916 were \$82,013,019.90.

Very substantial progress, the report says, has been made in the development of the industries that must eventually furnish a substitute for the military business which the company now has on its books. The manufacture and sale of fabrikoid, pyralin, lacquers, solvents and a variety of chemicals have all developed and become a part of current business. The purchase of the Harrison Brothers, and other paint and chemical companies is reported as a valuable line of industry, which is already successful and promises greater reward. The company's entry into the dye business is regarded as of the greatest importance.

The report says that the recent acquisition of a large interest in the General Motors Corporation and the Chevrolet Motor company opens up a new line of activity of great promise, for the motor companies are very large consumers of the fabrikoid, pyralin, paints and varnishes manufactured by the Du Pont company. Purchases of nitrate lands in Chile have been made to such an extent that it is expected that the company will soon be in position to produce all of the nitrates used by it in normal times.

All of these industries, according to the report, warrant the continued expectation that the 18 per cent. dividend declared last year can be maintained under normal conditions after the war.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.

9 PARK STREET, BOSTON, MASSACHUSETTS

SEC. HOUSTON SETS FORTH POLICY FOR HIGHWAY CONSTRUCTION

Secretary Houston of the Department of Agriculture, in a communication to the American Association of State Highway Officials, has set forth squarely the policy which he thinks should be followed in highway construction during the war. Secretary Houston says:

"So far as it is practicable to do so this department will urge the maintenance of the highways already constructed; the construction and completion of those highways which are vitally important because of their bearing upon the war situation or for the movement of commodities; the postponement of all highway construction relatively less essential or not based upon important military or economic needs. The department is preparing to suggest to the state highway departments the preparation of a schedule of work for the Federal aid projects for 1918 in line with this policy.

"In carrying out the policy thus announced there has been sent out by the Office of Public Roads of the Department of Agriculture, schedule forms on which the states are requested to set forth their proposed Federal aid work for the 1918 working season. These schedules call for a description of each road, the character, quantity and rail haul of the materials to be used, the probable cost, the amount of Federal funds desired, the specific purpose of the improvement, its bearing upon the war situation and what effect a delay of the

work until 1919 or later would have. With the information thus assembled and classified an efficient road construction program is assured. While it is impossible to make any definite statement regarding the transportation of road materials, the expectations are that the transportation situation will be improved

and that the shipment of such materials for essential projects can be made.

"Road construction and maintenance in the United States involve an annual expenditure of some \$300,000,000, and there is scarcely a section of the country that is not seriously affected by a marked disturbance in road work."

Worcester Central Point in New Route

Worcester will be one of the most important points on a new 1000-mile circuit from Montreal into New York state through New England and return when the projected plans of Charles S. Averill, manager of the Bancroft Hotel in that city are carried out. This new route for motorists will be known as the International Automobile Route, and A. L. Carron, a munitions manufacturer of Montreal and president of the Automobile Club of Canada, and George McNamee, secretary of the club, recently paid a visit to Worcester and held a consultation with Mr. Averill on laying it out.

Mr. Averill is working enthusiastically to see his idea placed in operation and has been busy securing the cooperation of hotel men along the route in New York state and New England, and with the two Canadian auto club officials, John Flannigan of Malone, N. Y., and William M. Kimball of Northampton. It

is planned to make Worcester the distributing point for all information regarding the route for the southern and eastern section of the United States, and it will be indicated on the maps as a desirable city in which to stop over several days on the route.

The route has been laid out over the best roads and lies through the finest scenic section of Canada and New England. Starting at Montreal the route will follow the course to Quebec, thence down through Malone, N. Y., to Paul Smith's place in the Adirondacks, along Lake Placid, Lake George to Saratoga Springs, thence to Albany over through the Berkshires to Springfield and to Worcester. From this point the route runs through to Boston, up the North Shore into Maine and thence into the White Mountains via Poland Springs; through Northern Maine to Jackman and into Canada.

Chauffeurs Reap Rich Harvest in Commissions

The American custom of tipping is one that has fostered many other evils, and is a practise to be discouraged. The evil has spread to such a degree that employees expect such gratuities for every service rendered, even though they may receive a regular salary for their work. Though the average chauffeur fails to realize the fact, his so-called "commissions" which he exacts from the garage where he houses the car, or from the supply man from whom he purchases accessories, are in the nature of tips. He may receive a salary from his employer for performing his duties, and be expected to purchase supplies where he can obtain the best quality and prices, yet affairs have reached such a stage that he has come to demand remuneration from the supply houses.

Morris Segal, president of a large garage in New York, and a director of the Garage Owners' Association of that city, recently stated that he believed the total amount paid by the garage owners to chauffeurs in New York City averaged nearly \$2,000,000 a year.

"The average garage, having a capacity of 100 cars, renders bills to owners which total about \$8000 a month,"

said Mr. Segal. "The average cost of keeping a car in the city is between \$80 and \$100 a month. Of this amount I venture to say at least 200 garages pay a 'rake off' of about 10 per cent. to chauffeurs. This means that these garage owners have been paying a total of about \$160,000 a month, or nearly \$2,000,000 yearly, to dishonest chauffeurs of New York City.

"It is virtually blackmail money, for if the garage owners refuse to pay it the chauffeurs take their business elsewhere, and the owners of the cars pay so little attention to the management of them that it is useless to appeal to them. Many garage owners have persistently refused to pay any form of tribute to the chauffeurs, despite the fact that their business has suffered on this account according to Mr. Segal. "The garage owners are tired of being victims of this extortion," he continued, "and many who have been paying these commissions are ready to come in with us if they are shown that we mean to stick together and fight this evil to a finish."

State authorities, presumably the office of the district attorney, have taken cognizance of the situation, and it is be-

lieved that an inquiry into the relations existing between chauffeurs and garage owners will be made. Several months ago the garage owners received a mysterious letter calling their attention to the fact that the law was being violated by the payment of commissions to chauffeurs, and later a placard was sent to each garage in the city, saying that such payments constituted a penal offense.

The garage men are not the only ones who suffer at the hands of the chauffeurs, the tire and accessory dealers, too, contributing, as do also the proprietors of gasoline filling stations. One garage proprietor who has always refused to pay commissions in any form to chauffeurs recently started the agitation against the practise through a series of advertisements, appealing directly to the owners, asking whether they preferred efficient service or commissions paid to chauffeurs. Both of the national organizations of chauffeurs, the Professional Chauffeurs' Club of America and the Professional Engineers' Club, are opposed to the acceptance of commissions by their members and the cooperation of both these organizations is looked for in suppressing the practise.

New Jersey Plans For Reciprocity

Automobile laws of the state of New Jersey have long been a source of complaint among motor car owners of adjoining states, as well as all the states along the Atlantic seaboard, as practically every one in motoring, either North or South, over the main highways of travel is obliged to pass through the state and therefore become subject to its requirements governing the operation of automobiles.

As the result of recent developments in that state there is now promise of relief from the disagreeable conditions that have been imposed upon non-resident motorists, and it is expected that automobile reciprocity privileges by the state of New Jersey to motorists of all kinds from Pennsylvania and other states will be granted. At a hearing on an act introduced to amend the laws so as to provide for reciprocal privileges within the state, as well as for abolishing the present 15 days' permission to use foreign motor vehicles in the state, there was a strong sentiment in favor of the amendment, based on the belief that such an attitude was only a fair one toward the other states, but the opinion was also set forth that by letting down the bars to "motorists" from adjoining states, Atlantic City and other resorts would reap a harvest of patronage that is now being diverted to Summer and Winter resorts in Pennsylvania and New York.

A bill which passed the House of the Jersey Legislature, permitting the use of yellow lights on automobiles at night, met with considerable opposition on the grounds that the way would be opened for the use of other colors, which would ultimately lead to confusion. The bill is now before the Senate body of that state.

Carless Driving in Iowa Causes Many Deaths.

Last year there were 281 persons in Iowa killed as result of automobile accidents, and the injured reached the total of 5200, or just 100 a week. During the four summer months the deaths averaged 40 a month, or more than one a day. Almost nine-tenths the number of these deaths and injuries were due to the carelessness on the part of the drivers of the cars. Reckless and often half-drunken drivers were responsible for the majority of the accidents. Sixty of the deaths were at railroad crossings, but every one of those must be set down as due to the drivers' thoughtlessness, as the railroad trains run on the tracks and every driver knows where the tracks are located, a fact which makes it reasonable to suppose that accident of this nature could be avoided easily. The driver should make it his business to stop and investigate before crossing the tracks, unless the crossings are so located that a clear view is afforded of the tracks for a considerable distance in both directions.

Good Advice from Magistrate House

Magistrate House, who presides over the Traffic Court in New York City, where he handles more traffic cases than any other justice in the world, commands respect when he gives advice on the operation of an automobile, since his daily task brings him in touch with thousands of motor car drivers, who have been apprehended for a violation of the law in some form.

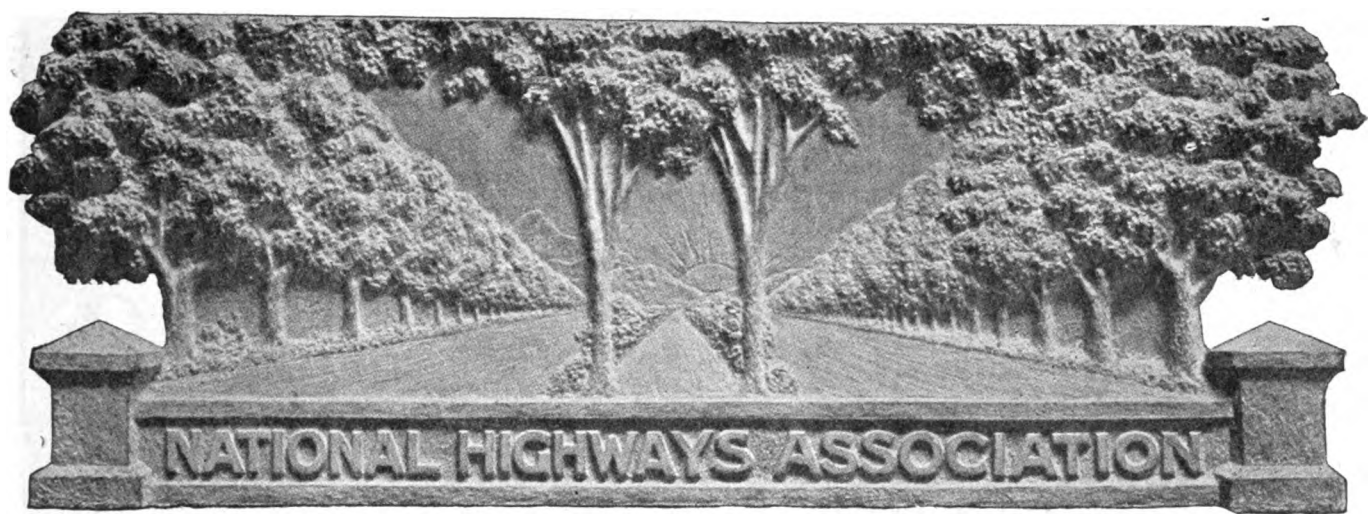
After hearing 102 cases one day last week he admonished those gathered in the court room as follows:

"You gentlemen all want pedestrians to walk where they ought, but you feel quite peeved when you are asked to do likewise in running your cars."

He also issued a bulletin in which he gave a warning to motor car operators as follows:

"Operators and drivers should always observe the rules which requires them to keep to the right. When a pedestrian starts across the street, no matter from which side, if you are in your proper place, you approach him from the left. When he reaches the middle of the street if you are where you should be, you approach him from the right.

"The pedestrian is not required to look for you where you have no right to be. He has the right to assume that you will stay where you belong. It is your duty to keep to the right."



Awards of Du Pont-Davis Photograph Contest

ANNOUNCEMENT has been made of the award of prizes in the Du Pont-Davis Road Photograph Prize Contest for which \$2600 was offered for the best road photographs. The contest closed on Tuesday, Nov. 7, 1916, but due to the large number of contestants (864 persons submitting 5513 photographs) and the entrance of the country into the war, there was an unavoidable delay in awarding prizes.

The prizes, which were awarded by Theodore Roosevelt, Mark Sullivan and Ida M. Tarbell, were as follows: First, \$500; five second prizes of \$100 each; 20 third prizes of \$25 each; 40 fourth prizes of \$15 each; 100 fifth prizes of \$5 each; 166 prizes in all, totaling \$2600. As

enumerate all the prize winners and the amounts, only the names of those winning \$100 or more are given.

An analysis of the returns from the contest brought out some very interesting facts. A total of 101 contestants were awarded one prize each, while two contestants were awarded six prizes each. One photograph was submitted by each of 163 contestants, while one contestant submitted 81 photographs. That the contest was nation wide in its scope was shown by the fact that not only every state in the Union was represented, but also Alaska, the Philippine Islands and Porto Rico. New York led with a total of 90 contestants, and Pennsylvania was second with 75; Illinois

FIRST SIX WINNERS AND AWARDS.

CONTESTANTS				Received by Contestant	
Names	Addresses			Total Money Value	No. of Prizes
	Street	Town	State		
George Ashbrook		Skidmore	Missouri	\$500	1
Howard H. Parker	529 E. Second St.	Salida	Colorado	\$100	1
Miss Florence B. Harrison	Hollo	Hollo	Philippine Isls.	100	1
Mrs. Jessie Howell Hull	121 11th Ave., North	Seattle	Washington	105	1
Russell C. Leavenworth		Boyerne City	Michigan	100	1
Irwin E. Gilbert		Frostburg	Maryland	125	6

the name of the contest would imply, it was held under the auspices of General Coleman Du Pont of Wilmington, Del., chairman of the Board of National Councilors of the National Highways Association, and Charles Henry Davis, president of the latter organization. The purpose of the contest was to secure for the National Highways Association photographs of roads, of adding strength to its membership and means, so that the organization could prosecute its work effectively for "good roads everywhere."

Prizes were awarded to over 124 contestants, but owing to the great amount of space that would be necessary to

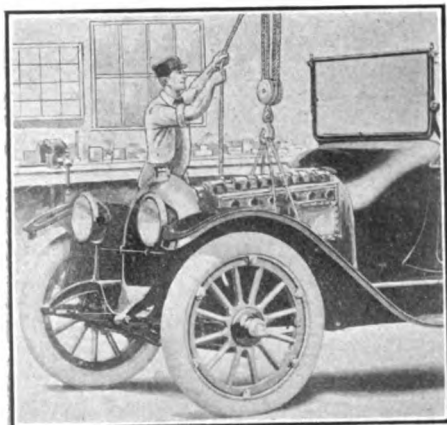
third with 68. The photographs were classified as follows: "Good roads," "bad roads," "the old and new road," "construction," "of human interest," "special features" and "motor vehicles." These seven main classifications were used in considering the photographs. Any picture might also belong in any one or more classifications than the one in which it was placed. For example, all of the pictures were either of good or bad roads, whether in another class or not. This classification was purely arbitrary and did not influence the distribution of prizes.

What the National Highways Association Is.

- A national organization.
- An educational force for good roads everywhere.
- A believer in national highways, built and maintained by the national government.
- A publisher and distributor of national highways literature and maps.
- A practical, working, successful enterprise.
- A central and directing body, making effective the efforts of all state or local associations which affiliate with it.
- A crystalizer of public sentiment and a means for directing that sentiment to the goal of accomplishment.

What the National Highways Association Is Not.

- It is not a political organization.
- It is not a maintainer of a lobby.
- It is not a wedge for opening legislative pork barrels under the guise of "road legislation."
- It is not an agent for or connection of any commercial interest, whether connected with road materials, road machinery, road construction, or otherwise.
- It is not a servant of any business, other organization or corporation.
- It is not a believer in any individual single road as more important than the system of national highways, for which it stands.
- It is not an antagonist of any road organization, association or corporation interested in furthering "Good Roads Everywhere."



Overhauling *The* Automobile

CHALMERS 6-30

This is the 16th of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The 17th article of this series will appear in the March 10th issue of the Automobile Journal.

THOUGH there have been a number of changes in design on the Chalmers type 6-30, models 35A, 35B and 35C, are so near alike that they will all be taken up in this story.

The engines of these models are of the L head type, fitted with removable cylinder heads, and have the valves on the left side of the block. Cooling is by thermo syphon.

Models 35A and 35B cylinder blocks were designed to have the carburetors mounted on the right side of the blocks, the manifold passage passing between the third and fourth cylinders and thence branching off to the various intake passages. Model 35C, however, is fitted with both intake and exhaust manifolds mounted on the left side of the engine.

Models 35A and 35B timing gears were direct gear driven, while those of 35C are driven by silent chain. The distributors or timer units on the models 35A and 35B were driven from a gear on the left side of the engine and are located on a vertical shaft mounted between the generator and timing gear case. The distributor on the model 35C is located on the right side and is mounted directly upon a vertical shaft upon the generator, both of these units being driven by the timing gear silent chain.

The oil pumps on models 35A and 35B were driven from the timing unit and located beneath that unit, while the pump on model 35C is driven from the generator shaft and mounted upon the generator.

The transmission gearsets of the three models are practically the same, and though the clutches differ in construction they are disassembled in practically the same way. Though the rear axles are the same, the differential construction differs; those of models 35A and 35B are two pinion differentials, while the 35C is fitted with three. The directions for disassembly are the same, however.

This covers the main points of difference between the three models. Other small points will be taken up in the course of the article.

Clean the Cooling System.

The cooling system should first be cleaned. Make a strong solution of either potash lye or washing soda and after having strained it through a cheese cloth place it in the radiator. Run the engine for about five minutes, or until the solution is fully warmed, then let it stand for half an hour. Run the engine again until the system has thoroughly heated and drain off the solution. This solution should be kept until after the engine has been assembled and the above process repeated.

After the solution has been drained from the system the radiator should be filled with clean water, the engine run until heated, the water drained and more water added, until the system is thoroughly cleaned. The radiator should then be removed from the car, after the tie rod and water hose has been disconnected and the radiator retaining bolts removed.

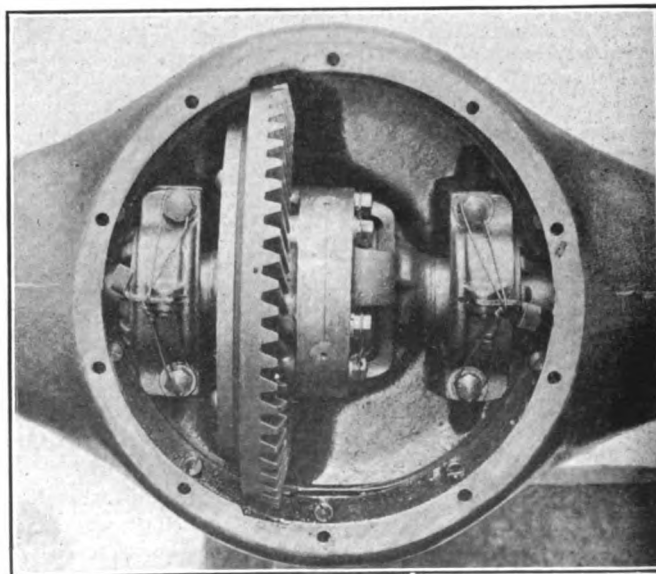
Tag the secondary wires, leading to the spark plugs, and disconnect them from the plugs. The cap screws retaining the cylinder head should next be removed, and the cylinder head taken from the block. With a screw driver or putty knife, and a scratch brush, clean all carbon from the engine. Frequent applications of kerosene oil will soften the carbon and facilitate the cleaning of the engine.

Before removing the cylinder heads from models 35A and 35B, the carburetor hot air intake should be unscrewed from the hot air stove and removed and the distributor or timer unit taken off. This unit is retained in the housing at the lower end by four cap screws and at the top by a bracket bolted to the cylinder block.

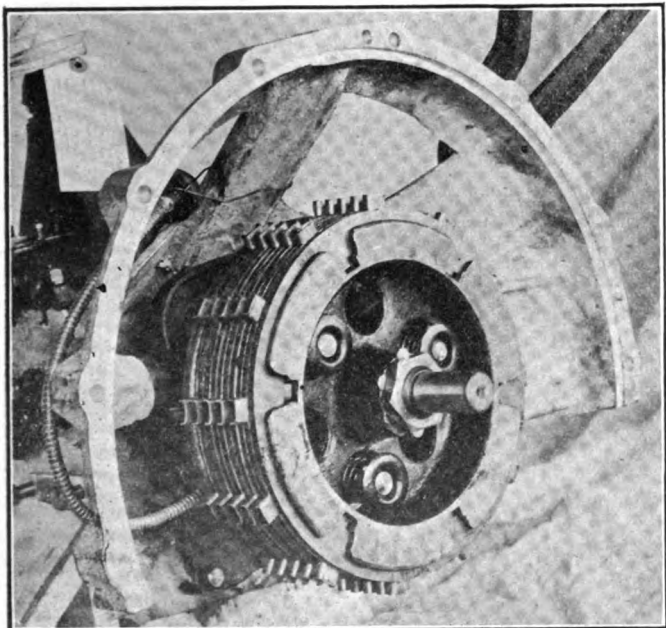
Valve Mechanism.

The valves are retained by split washers and spring caps in the usual way and may be removed by compressing the springs with a valve spring lifter, removing the split washers and slipping the valves out from the top.

The utmost care should be observed in keeping the valves in their proper places, and it is inadvisable to interchange them. Each valve should be given a careful inspection, and it is essential that the valve stems fit the guides very closely. A loose valve guide results in loss of power and inefficiency. The valve guides in the Chalmers engine may be



View of Chalmers Model 35C Differential, Showing Bearing Adjustments, Retaining Caps and Adjusting Locks, with Method of Fastening Same with Wire.



Clutch on Model 35C, Removed from Engine, but in Transmission, Showing Adjusting Springs, Clutch Retaining Nut and "Cloverleaf" Lock Washer Spread Out.

driven out from the top with a bar of iron, slightly smaller than the outside diameter of the guide.

After having replaced with new the necessary guides or valves, all valves should be ground into place by means of grinding compound, taking care not to allow any of the compound to work into the cylinders or valve ports. After the valves have been ground all parts should be given a thorough cleaning with kerosene to remove grinding paste, and the valves replaced, with the springs, caps and lock washers in position. If this rule is observed there is little danger of losing the valve parts when the engine is fully disassembled.

After the oil has been drained from the base the lower part of the crank case should be removed. On the model 35C the oil tube leading from the oil pump to the base should first be disconnected at the base end.

With the oil base removed from the engine the connecting rods and main bearings may be examined. Such is the construction of this engine, that unless the main bearings need replacement, the crankshaft or the cylinder block repairs, it will be unnecessary to remove the engine from the chassis. A careful examination at this point should determine this.

Connecting Rod Removal.

The connecting rods and piston assemblies are removed through the top of the cylinder block after the connecting rod caps have been taken off. It is always advisable to replace pistons in their proper cylinders, rather than to change them from one cylinder to another. Unless the babbitt shows much wear, or is broken at any point, adjustment of the connecting rods may be made by the removal of shims.

After the pistons have been removed the cylinders should be examined for scores or scratches and the necessary repairs made. Deep scores may be filled by welding or the plating process, an operation which will necessitate the removal of the engine from the chassis.

Sometimes small scores or scratches may be filled by the graphite method, which is applied as follows: After the engine has been assembled and started, while it is being run at normal speed, slowly pour into the carburetor air intake one or two teaspoonfuls of flake graphite. After one or two applications of this remedy ordinary scratches and scores will be coated over with a thin coating of graphite, which presents a glass hard bearing surface.

Unconventional Push Rod Mounting.

The push rods are mounted in cages, which are cast in two parts, each section holding six push rods. The sections are retained by cap screws, which should next be removed and the cages taken from the engine. The push rods may then be slipped from the cages and examined. It is essential that the push rod rollers are absolutely round and fit the roller shafts tightly or the action will be noisy. Replacements should be made at this point if necessary.

The fan assembly and belt should be removed next in order. The fan drive pulley on the crankshaft is retained by a large nut, which is locked by small set screws. This nut is removed and the pulley pulled from the shaft. With the pulley out of the way the timing gear case cover should be taken off, exposing the gears or chain as the case may be.

At this point in the overhaul of the model 35C the generator and timing unit should be removed. To do this, first disconnect the oil pump tubes at the pump, and after tagging the ignition wires, disconnect them from the units. Only those wires leading from the units to the chassis need be disconnected, however.

The generator unit on model 35C is retained on the timing gear housing by three cap screws, the two upper screws being clamp screws and fitted in slots on the generator flange. The generator unit swings upon the lower cap screw, and so arranged that by moving it upon the lower screw as a pivot the drive chain may be adjusted. The three cap screws should be removed and the generator, with oil pump, distributor unit and coil removed. The driving chain may then be removed.

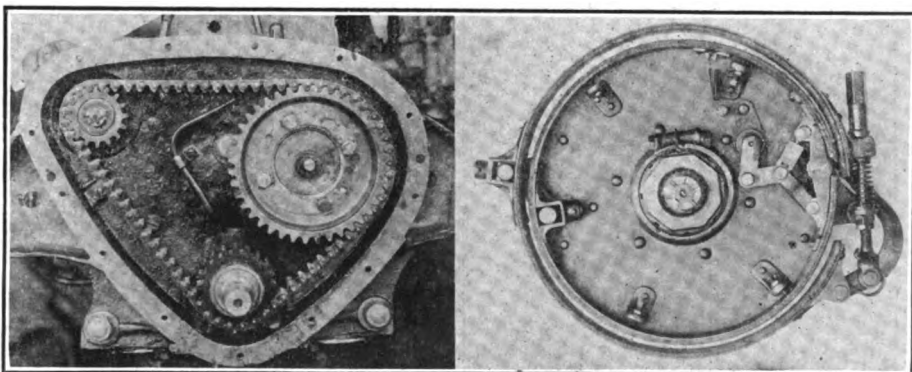
Adjusting Generator Chain.

When the generator unit is replaced care should be observed not to get the driving chain too tight, or it will be noisy. Clamp the generator in place with the lower cap screw and swing the top back until the chain is tight. Take up one of the upper cap screws, just enough to bind the generator in place, and with a light hammer or wood block tap against the side of the generator until the tension is removed from the chain, but not enough to cause any chain slack. Then tighten all bolts and run the engine, listening to the sound made by the chain. A hum or buzz indicates too tight a chain, and should this occur the bolts should be loosened slightly and the generator tapped over with a hammer, being careful not to permit too much looseness in the chain.

The camshaft gear is fastened to the camshaft flange by four cap screws, which are kept from backing out by the bent over lugs on two retainer strips. Unless the gear or shaft shows wear the gear need not be removed, for the whole camshaft may be pulled out of the engine from the front. The camshaft end bearings are retained by set screws from the outside.

The timing gear on the crankshaft is keyed on and may be pulled from the shaft with a wheel puller. The whole timing gear case may then be removed if necessary to take out the crankshaft.

On the models 35A and 35B the generator should be uncoupled at the coupling between the timer pump unit and after the retaining screws have been taken out the generator removed.



At Left: Front of Chalmers Model 35C Engine, Showing Timing Sprockets, Silent Chain and Oil Duct. At Right: End of Rear Axle and Housing with Wheel Removed, Showing Brake Arrangement, Bearing Lock and Bearing Adjustment.

The generator drive gear on this model must be removed before the timing gear rear case can be taken off. This gear is retained by a castellated nut and keyed to the shaft. When the gear has been taken off the shaft the timer or ignition gear carrier unit may be unbolted from the timing gear case and taken off, together with the oil pump, after the necessary tubing has been disconnected.

Clean Oiling System.

The oil pumps on all models are gear pumps and should receive careful cleaning. The oil tubing should all be cleaned with wires and flushed with kerosene. The pump itself may be taken from the gear carrier unit and the latter unit disassembled by removing the caps and driving out the generator drive shaft bushings.

If the engine has to be taken from the chassis the exhaust manifold and carburetor or intake manifold should be unbolted from the block at this point. In replacing the carburetor or the intake manifold one should be sure that all joints are made tight, or the engine will not run satisfactorily. New gaskets should be used in every case.

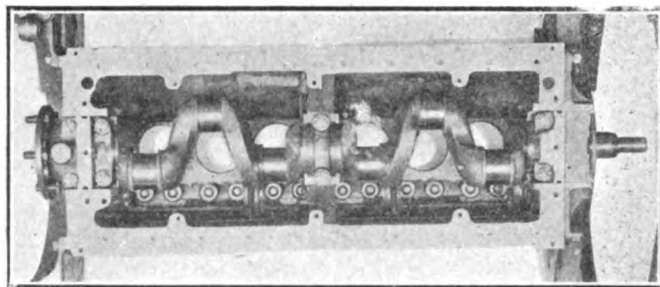
At this stage of the overhaul the transmission cover, together with shift lever and emergency brake, should be removed and the front universal joint disconnected. The transmission should then be supported upon a box or jacks and the cap screws fastening the bell housing to the engine removed. When this is done the transmission unit may be drawn back from the engine, carrying with it the clutch assembly.

Differences in Clutch Design.

On both the models 35A and 35B the driving clutch plates were carried upon three studs mounted on the flywheel, while on model 35C the driving plates were fitted with lips which engaged in splines in the flywheel. In either case, however, the clutch assembly may be drawn out with the transmission.

At this point the engine may be removed from the chassis if necessary and further disassembled. An illustration, accompanying this article shows a lower view of the engine and the three main bearing retaining caps. The flywheel is retained by cap screws from the rear and by studs, and should be inspected carefully. Should the cap screws or studs show evidences of wear they should be replaced with new, for it is highly important that the flywheel be firmly fastened to the crankshaft.

The clutches on all three models are retained upon the clutch shaft, which is integral with the transmission driving gear by a large lock nut. The nut is kept from turning by a "cloverleaf" lock washer. After the lock nut has been removed the whole assembly may be pulled from the shaft with



View of Engine from Underneath, Showing Crankshaft Bearings and Push Rods in Place.

a wheel puller. Before removing the clutch assembly from the shaft the clutch release arm should be disconnected.

A large adjusting nut on the end of the clutch sleeve retains the thrust bearing in place and should next be removed. An iron Y rod may be used to compress the three clutch springs, using a short length of chain as a fulcrum. Remove the cotter pins in the clutch spring adjusting nuts, compress the springs and remove the nuts. The whole clutch assembly may then be pulled down. In assembling this unit much time will be saved if the driving discs are replaced with the projections (35C) or the holes (35A and 35B) in the discs in line.

Cleaning Clutch Fabric.

The clutch fabric may be cleaned with kerosene oil and a stiff brush. Should it show signs of wear it should be removed and new facing substituted. All of the discs, both driving and driven, should be tried in or upon their respective driving members. There should be but little play between the discs and the members and upon evidence of wear, either in the holes or in the plate projections, the plate or plates should be replaced with new.

In assembling the clutch the driving hub should be placed upon a flat surface and a driving disc placed upon it, then alternately, driven and driving discs until all 11 plates have been used. The sleeve should next be placed inside the pressure plate, taking care to have the two slots register with the projections on the plate, and this assembly put over the clutch. The springs and spring studs are next put into place, the springs compressed and the nuts placed on the studs. Each nut should be turned down until it is flush with the end of the stud, and final adjustment made after the clutch is assembled in the car.

Disassembling Transmission.

The disassembly of the transmission is an easy matter, all bearings being retained by caps, which are held in place by four cap screws each. The outer races of all the main and countershaft roller bearings are retained by set screws or dowels, which must be removed before the bearings can be driven from the housings.

After having removed the front driving gear bearing the drive gear may be taken out from the front. To remove the sliding gear shaft take off the front universal joint member and slip the shaft through toward the front of the transmission. The counter shaft can be removed after the rear roller bearing has been taken out.

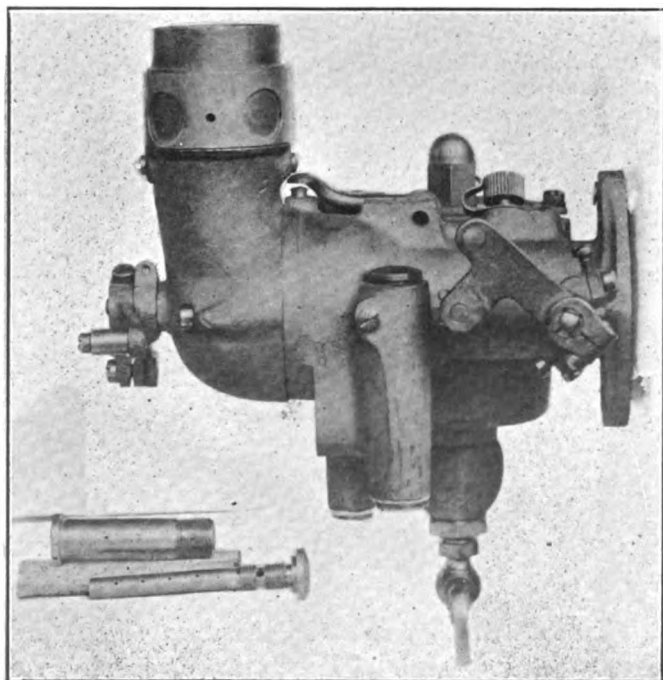
The rear axles are of the semi-floating type, but may be disassembled without removing the axle housing from the car. Support the rear of the car upon boxes or horses and take off the hub caps. After removing the wheel retaining nuts pull the wheels from the shafts and take out the bearing lock nut device.

The bearing retaining or so-called adjusting nuts may then be backed out of the housing, permitting the removal of the shafts. The differential assembly, together with the pinion drive gear, is mounted upon a removable housing. The 10 bolts which hold the differential carrier to the rear axle housing are next removed and the differential assembly taken from the housing.

Differential Carrier Fastening.

The bolts which fasten the differential carrier in place have slotted heads and should one experience trouble in re-

(Continued on Page 78.)



Carburetor Used on Model 35C.

Experiment With Non-Skid Road Surface

THERE is, perhaps, no factor responsible for so many accidents as skidding automobiles, due to slippery pavements. In addition to this horse drawn vehicles have almost as much trouble on slippery pavements and many a good horse has been injured through bad falls on hard surfaced roads.

Modern road engineers are working for road efficiency and consequently direct their efforts toward the production of a road surface which will present a hard, smooth face and be impervious to wear as far as possible. They are not concerned with the skidding problem, but aim to produce a wearing surface, for they know that drivers will adopt methods to prevent skidding, even though such means result in damage to their machines to a certain extent.

Chains and rough tread tires are the usual devices used to prevent wheel slippage, though at best they are not efficient. With the use of chains comes the excessive tire wear. Rough or non-skid tires answer the purpose to a certain extent and though such a tire may be efficient when new, sooner or later when the tread is worn off, the tire presents a smooth surface and the danger increases.

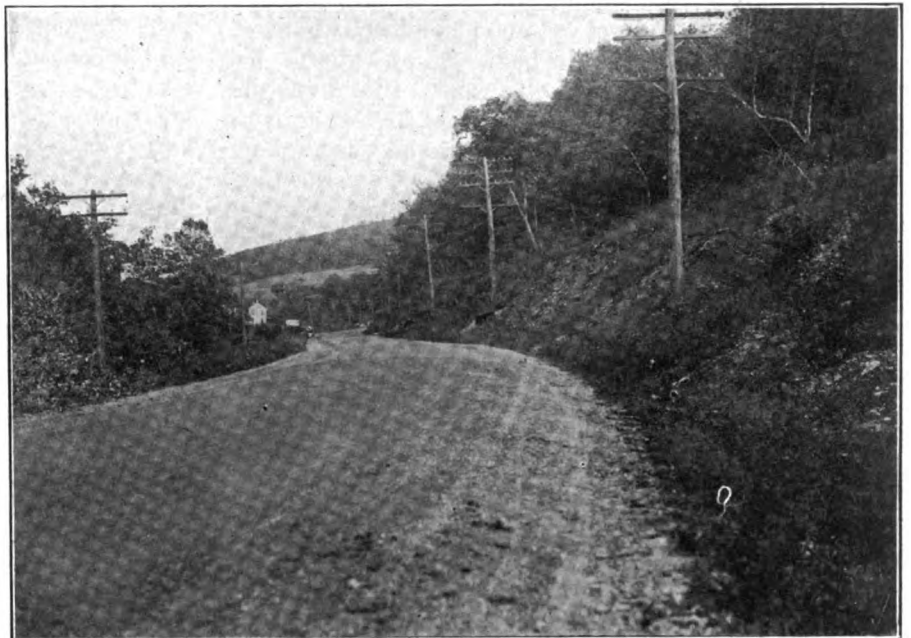
Very little work has been towards attacking this problem from the standpoint of the road surface. Of course steep grades have been paved with stone block or with hillside brick, but this is quite expensive and is not a satisfactory paving for long, level stretches of roads. A rather interesting step has recently been made towards developing a non-skid road surface suitable for average conditions.

In the hilly districts of Western Mary-

land a closely watched experiment is being conducted on a tar bound macadam surface over a water bound macadam foundation. Several grades of tar binder, as a surface treatment, have been previously used, but under heavy rolling and continued traffic the binder had flushed up through the stone chip covering, making a smooth surface. In fact, such a surface, after being in use for a short while, has closely resembled the smooth surface of an asphalt paved street, which when wet and cold was ex-

addition to this the footing is rendered much safer for horses.

While the surface has demonstrated its fitness for non-skidding when wet, just how it will behave under winter conditions of ice and sleet is yet to be shown. Every indication points to at least a fair showing in this respect when compared to an absolutely smooth surface. If it should be effective in stopping or reducing the dangerous slipperiness occasioned by winter conditions, a long step will have been made towards



View of a Pontared Road on the Frederick Pike at Ellicott City, Maryland.

ceedingly slippery for horses and caused dangerous skidding of automobiles and trucks.

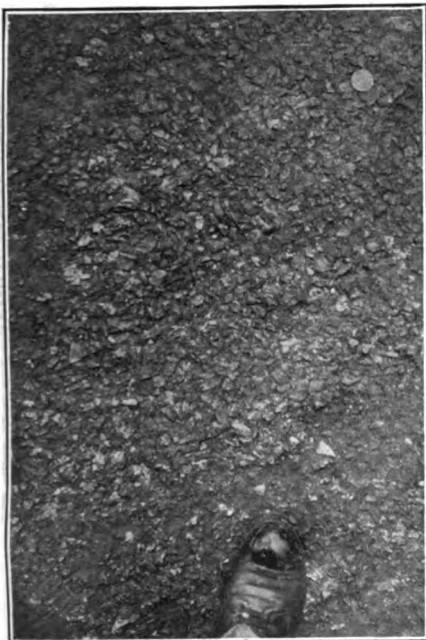
This year a special grade of Pontar was used on the surface as a binder, and it is hoped a non-skid surface has resulted, for up to the present time the results have been very encouraging. This binder was put on in the same manner as the ordinary tar surface treatments, and covered with stone chips. There is this difference, however, that under heavy rolling and continued traffic the binder has not flushed completely up over the chip covering. This has resulted in a slightly pitted surface, somewhat resembling smallpox markings, on the face of the road. In the accompanying photograph, which was taken looking directly down upon the surface of the road, these small pits are shown to good effect. The small round white object near the upper right hand corner is a silver quarter dollar, which illustrates the comparative size of the pits. Under wet weather conditions this surface has proven a great benefit, as the skidding of automobiles and trucks has been greatly reduced, the action of the pits upon the tire surface being similar, if not the same, as the action of non-skid tire cups upon a smooth, hard road. In

"Safety First" travel. Then also, a great saving will have been effected in the wear on automobile tires by doing away with the necessity for using chains, which cut and bruise the tire fabric when used on hard surfaced roads.

MOTORISTS SHOULD MAKE STUDY OF LUBRICATION.

The value of lubrication to such an intricate piece of mechanism as an automobile cannot be overestimated. Many inexperienced drivers and owners think that the process of lubricating an automobile consists of applying oil to all open crevices, or holes, but pay no attention to the quality of lubricant; a rather impractical and costly treatment for a machine costing many hundreds of dollars.

Graphite has long been acknowledged as an ideal lubricant for bearing surfaces and the Dixon graphite lubricants are well known. This company has developed their products to perfection and to assist motorists they have issued a lubrication chart on this important subject, which is furnished free of charge upon application to Dixon Graphite Works, Jersey City, N. J.



Looking Down on Road Surfaced with Pontar, Showing Comparative Size of Pits with 25 Cent Piece.

PLATE XVII.

IDEAL STUCCO GARAGE FOR HOUSING ONE CAR

**Substantial Semi-Fireproof Structure Suitable for Any Estate
with All Essential Appointments and Pleasing Exterior**

Designed by the Architectural Department of The Automobile Journal.

AN IDEAL home garage for one car should combine the qualities of durability and practicability and at the same time have proper equipment and appointments for housing and maintaining the car in good condition, both as to appearance and mechanical operation. To meet these requirements a substantial structure is necessary, although it need not be elaborate or expensive. The one shown in the accompanying plate meets the needs of a person keeping one car and affords all the essentials that the average man would expect, and while not pretentious as shown on the elevation in the accompanying plate, its appearance would not detract from the value of any estate. The exterior walls being of stucco, they are susceptible of treatment to produce a varied finish if it is desired to make the building harmonize with surrounding structures.

It is a good plan to lay the concrete foundation walls and floor at the same time. In making the excavations for the walls provision for the drain and sewer connections should be made as well as for the entry of the gasoline feed pipe from the underground tank. The concrete foundation walls made of a mixture of one part cement, two parts sand and five parts of screened gravel or crushed stone, should be extended at least 42 inches below grade. While excavating, the earth within the walls should be removed to the depth of one foot and cinders substituted as a foundation for the concrete floor, which should be four inches thick. The first three inches of the floor should be made of a mixture same as used in the walls, but the surface layer, an inch thick, should consist of one part cement and two parts sand.

The framing, including rafters, studs, plate and sills are shown in detail. Spruce is a very suitable material for these parts of the structure, while white pine stock is preferable for the exterior woodwork, including crown mold, fascia, plancier, bed mould, frieze, window and door casings, window band and doors. At least two coats of good quality paint should be used on all the exterior wood work, as this material is the only part exposed that suffers damage from the weather.

Two large swinging doors are provided. Owing to the great leverage exerted on a heavy swinging type of door, it is difficult to keep them

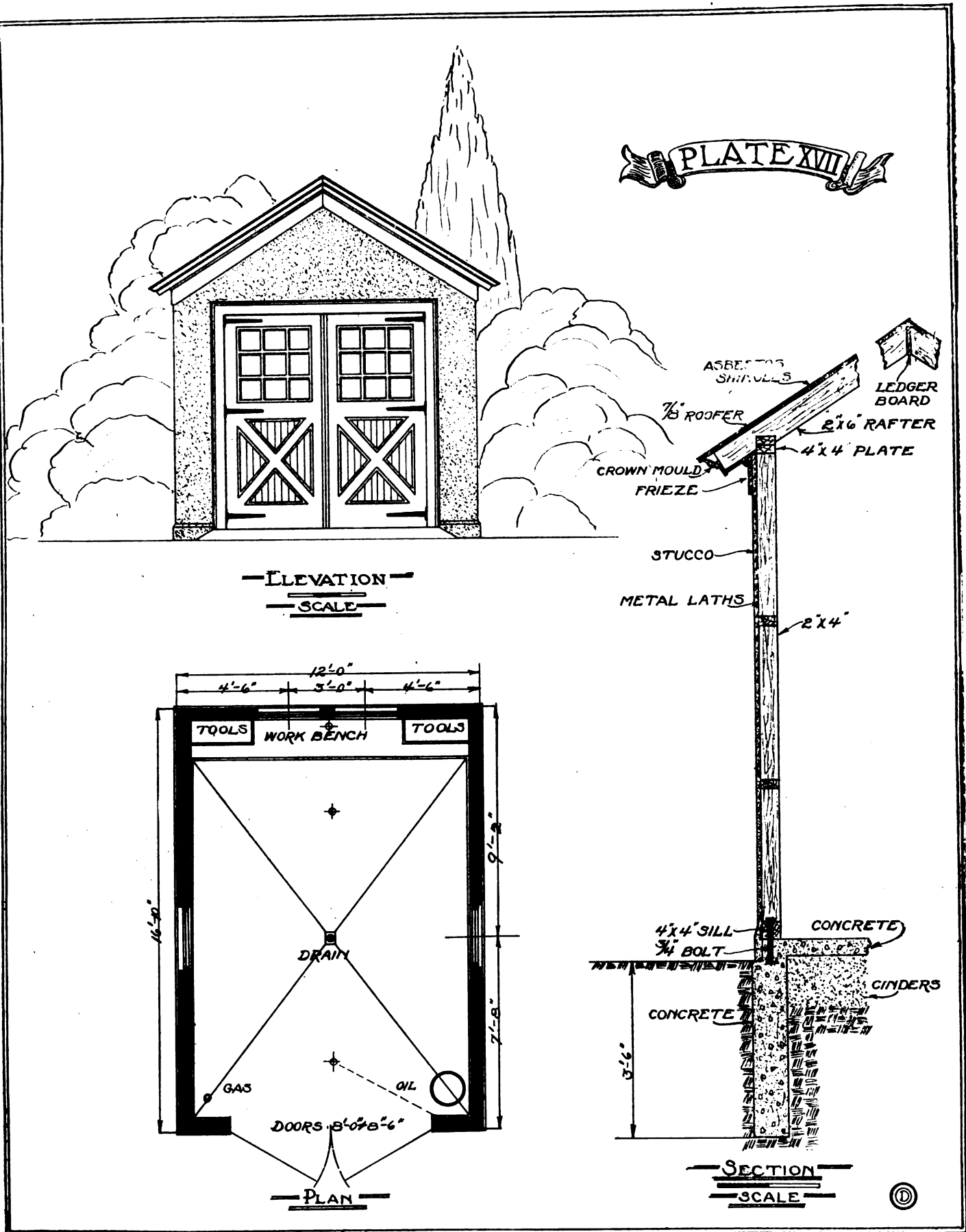
hung in position unless the best grade of heavy hinges are used. The Stanley Works, New Britain, Conn., which manufactures a line of garage hardware, make special hinges for this purpose, which are designed to make the doors swing easy, and to maintain them in position practically for the life of the building. These are known as Stanley wrought iron door hinges and are designed for heavy doors and are equipped with ball bearings fitted between the hinge joints. There are several sizes of which a full description and detail of operation is included in the catalogue that will be sent upon application to the company.

Several different kinds of metal lathing are on the market. The ribbed metal lath is nailed directly to the wood studs and is given three coats of stucco on the outside and a single coat of cement on the inside, making practically a concrete wall 1½ inches thick. A more common method of construction is to place one-inch sheathing on the wood studs, cover with a waterproofing tar felt paper upon which furring strips are applied to receive the expanded metal lath or wire fabric. With either method wire lath is used on the inside wall, coated with a cement mortar.

The last step in completing the garage is the application of the stucco. The first coat should be one part cement, three parts of clean, well graded sand, 10 per cent. of the weight of the cement of hydrated lime. One-half pound of hair per 100 pounds of cement may be used if the stucco is to be placed on metal lath. This coat should be thoroughly scratched before it has set to furnish a good base for the second coat. As soon as possible after the first coat has set the second should be applied. This coat or ground coat, as it is called, should consist of one part cement, 2½ parts clean, well graded sand and 10 per cent. of the weight of the cement of hydrated lime. This coat brings the surface to its true lines and the corners and edges should be in sharp outline. This coat should also be well scratched before it sets to furnish a bond for the finish coat, which can be varied to obtain any desired finished effect as to surface or color.

A garage of this type should be erected under average conditions at a cost of from 900 to \$1000. Aside from repainting the exterior wood work every three or four years, the expense of maintenance will be found negligible.

PLATE XVII

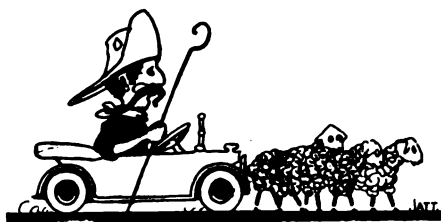




The day of the toll road is rapidly passing, a recent proof of which has appeared in the taking over of the old York-Philadelphia road by the State of Pennsylvania. Through this state action a number of toll gates have automatically disappeared, greatly to the joy of the car owners using this section of the highway. As early as 1693 the colonial inhabitants living along this route appealed to the governor for a good road to Philadelphia and secured the building of a log and plank highway, which was regarded by them as a wonderful specimen of improved road. This section of road is now a part of the Lincoln Highway.

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In the great Southwest the cow puncher's pony, which made life so picturesque on the great ranches, is rapidly disappearing, and while a long cherished institution in the minds of both the "tenderfeet" of the East and the Westerners themselves, its surrender to the automobile is welcomed. The men not only find them adaptable for transporting the sheep, but also for



rounding them up, and when the day's work is done they have more time on their hands for recreation, as the usual time devoted to the care and grooming of their ponies is dispensed with.

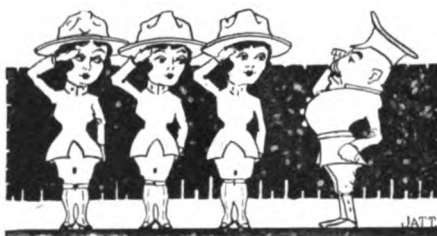
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The island of Guam has never regained its place in the limelight since the Spanish war days, but is rapidly developing as a market for export business from this country, and is enjoying an exceptional state of prosperity. In the fiscal year ending June 30 last this country exported to Guam merchandise to the value of \$177,163, including \$14,000 worth of automobiles and automobile parts.

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The American farmer considers the passenger automobile as an indispensable part of his farm equipment. Without the automobile the farmer would be handicapped to an extent which would seriously affect the highly important food supply. These facts were set forth conclusively by farmers in their replies to

the questionnaires sent out by the Haynes Automobile Co. recently. The letters were sent to 1000 owners picked at random from every state. The fact that approximately one-seventh of the replies were from farmers indicates the extent to which high-grade cars are used by agriculturists.



The girls of the Goodyear Tire and Rubber Co., at Akron, O., have indicated their interest in military life by forming a military company. The company is organized as a branch of the Y. W. C. A. and is part of the federation of girls' clubs belonging to that institution. The drills are conducted under the supervision of the official Goodyear drill master. The esprit de corps among the girls is excellent and the commander believes that they would acquit themselves with honor and would show valor in action equal to that of the famous Russian Battalion of Death, composed of women, who volunteered their services for the defense of their country.

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The fluid which issues from the rubber tree when tapped is known as "latex" in the localities where it is produced. It is slightly alkaline and contains small quantities of resin, traces of sugar and mineral salts and about 60 per cent. water. In color it is a creamy white. It is solidified or coagulated by acetic acid, the action being something like the souring of milk. On the rubber plantation of the Goodyear Tire and Rubber Co., in Sumatra, the latex is collected from the trees each morning and poured into a large vat. In the evening acetic acid is added and the latex allowed to stand over night. By morning the rubber particles have separated from the water and are ready to be transformed into large rubber sheets.



Even if the National Prohibition amendment is not enacted those that lean toward "the cup that cheers" in Connecticut will have to be very discreet in their imbibations, or else give up their motor cars, as the motor department of the state has announced that in the future it will issue no operator's license to people known as habitual users of intoxicants. In order to take out new license both new applicants and present holders of licenses must be examined by the deputy inspector of the district; all renewals of licenses must be sworn to.

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Women have captured the vote in New York state and are entering practically every form of business employment occupied by man, so why shouldn't they dispense with his services entirely as did an aggregation of ladies in California who staged an automobile meet entirely under female auspices. All the entrants were women, as were also the officials of the race, while Mrs. Barney Oldfield, wife of the erstwhile speed king, served as starter. The women not only successfully eliminated the men from the affair, but in the various events



set up some remarkable speed records, considering that they were established by the so-called timid sex.

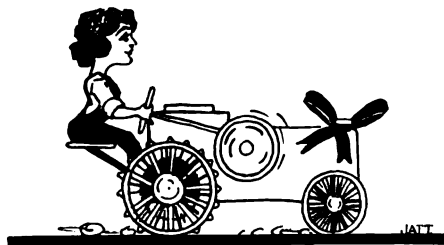
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B. F. Tefft, Jr., of Arctic, R. I., uses a Maxwell one-ton truck to transport his racing horses and stable accoutrements from track to track. The first time he employed this means of transporting his racing equipment he carried two horses, three men, two sulkies, two trunks and supplies on one load. Owing to the railroad congestion this method was also decided upon by the Bay State shortship circuit, which is an organization of horse owners who race horses in Massachusetts.

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A heavy motor truck dropped 25 feet from the Harvard bridge in Boston on to the ice after breaking through the railing. The car turned over in the air and struck bottom up, but despite its great weight the ice was only cracked.

Among a hundred odd applications for membership in the tractor school of the Ohio State University, one was found to have been filed by a girl. Tony Meldhal of Florence, Ind., father of the girl, who is 18 years of age, in asking permission



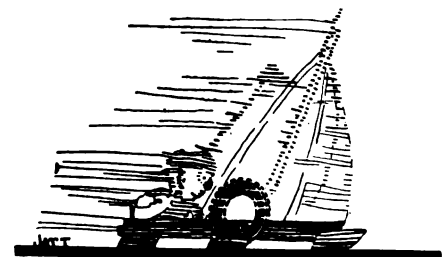
for his daughter to attend the school, said that as he had no son to send to the school he wanted his daughter to learn the operation of a tractor. "My daughter," he said, "is my farmer."

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The unprecedented snow fall throughout the North recently, causing a complete tie up of all kinds of transportation for several days, presented a wonderful opportunity for the inhabitants along the Lincoln Highway to show a cooperative spirit in the removal of snow to keep motor transportation open. All along the highway the people responded magnificently. The various highway commissioners and superintendents experienced no trouble in securing sufficient labor to keep the way clear, although for several days the drifting snows presented a formidable front. At Greensburg, Pa., 60 young men from the high school volunteered to assist in this work and were permitted by the school authorities to do their bit in snow shoveling. The first vehicles to get through as a result of their efforts were the Good-year Akron-Boston trucks and a train of army trucks enroute to Baltimore.

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Of the numerous methods of transportation that have been brought into action to relieve the freight embargoes and congestion during the past six months, probably the employment of an ice boat is the most novel. The right rear wheel and tire of a truck that was leading a fleet in Lorain, O., was put out of commission, blocking the progress of the whole fleet. The driver got in touch



with a local firm of tire dealers, who immediately telephoned to the Firestone branch at Cleveland for a 42x12 truck tire. The manager of the branch finding that freight, express or motor truck haulage would not hand the delivery in time, called up a friend who owns an ice boat and the latter put the tire on his speedy craft and made the trip in an hour.

Secretary of State Hugo of New York in an address delivered last week stated that 411,568 automobiles were registered in 1917, a gain of 93,702 over the preceding year. The receipts of the automobile bureau were \$4,282,114, a gain of \$1,626,072, or 61.17 per cent. The increase showed a gain in commercial cars of 21,063. "I believe that a year hence New York state will have half a million cars," he said, "and while the increases in commercial cars in 1917 was remarkable, the coming months will see even a greater growth because our modern day business methods are demanding a speedy and flexible method of transportation, particularly when freights are congested as they now are."

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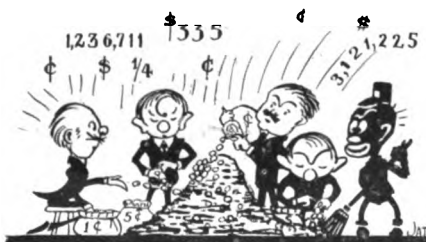
Judge Burke of the Municipal Court in Boston, when informed that a prisoner before him had been operating an automobile for six years without registering and obtaining a license, told the man that he had been a pirate on the highways all that time. The only excuse offered for this persistent evasion of the law was that the defendant had simply been careless.



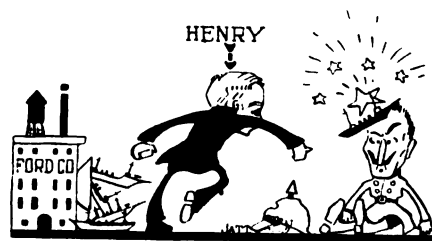
The House of Assembly in the state of New Jersey has passed a law raising the speed limit for automobiles from 25 to 30 miles an hour in the open country. Representatives from the country districts opposed the bill, but it passed with a vote of 39 to 10. It has long been felt by people in that state that the speed limitations of 25 miles an hour in the open country, where there was little danger attending a car going at 40 miles an hour if carefully operated, was an unreasonable requirement. Many other conditions in the Jersey motor laws have come up for amendment at the present session of the legislature.

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Mrs. J. W. Brooks of Thompsonstown, Ala., entered the Long-Lewis Hardware Co.'s store, the Maxwell agency in her town, and informed the clerk that she wanted the touring car that stood on the floor and was ready to pay for it. As is customary in such a case the salesman, lost no time in inscribing the necessary details upon an order blank, but was dumfounded when he turned around to



request a check or money to the amount of \$745, and instead was passed a very heavy sack filled with small coins. The lady explained that it was her savings of a year, just as she had thrown them in the bag, and that if he could count the



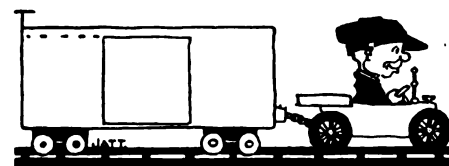
coins they would total the necessary amount. Four men were put at the task and finished it just at sundown.

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It was a queer fate that ordained that the ope man in the universe who exerted the most strenuous and stupendous effort to stop the war by mediation should later become one of the most potential factors in bringing about the defeat of the enemy by martial methods. This man is Henry Ford, who has converted a large part of his great plant at Detroit to manufacturing Liberty engines and U boat destroyers on a scale as great and rapid almost as his production schedule of cars. He has already laid the keel for the first of the fleet of super-submarine chasers and the work will be laid out on a progressive scale so that a production schedule of one boat a day may possibly be attained.

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A dealer in Providence, R. I., who had been seriously inconvenienced in his business through lack of switching facilities in the railroad yard there, decided that he would try one of his old Dodge cars as a substitute for a locomotive in moving the freight cars about. The car had seen more than 20,000 miles



of service, yet it moved the 50,000 pound freight cars about with comparative ease, "kicking" them up to the platform where they could be unloaded.

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At the annual meeting of the Automobile Club of Pittsburgh the attorney for the organization announced that the war had lessened the activities of automobile speed traps. The following officers were elected: President, H. Lee Mason, Jr.; vice presidents, Reade W. Bailey, Dr. John A. Hawkins, J. W. Sherrer; secretary, Paul C. Wolff; treasurer, A. E. Niemann; governors for four years, John C. Bragdon, Dr. S. S. Brown, L. B. Fleming, Frank B. Nimick; governor for two years, John I. Shaw.

Dame Fashion Bows to Decree of Conservation

THE approach of Spring, greatly to the delight of the motor car enthusiast, draws near. Tales of blizzards and the shivery below-zero temperature will soon be forgotten upon the arrival of the balmy air of Spring and the pranks of his highness, Jack Frost, whose impish presence has so much to do with our well being and comfort and who has lingered over zealously with us this winter, will fade away with the arrival of the crocus and daffodil. Motoring is no longer a luxury in our lives—it is a necessity and never more so than at the present time. Every woman is deeply interested in war work of some kind and is giving much of her vitality and herself toward speeding our cause to victory and relaxation from these arduous duties must be taken to give her renewed energy to continue doing her "bit," and in no way can she so quickly and efficiently build up her frayed and exhausted nerves and over taxed energies than by spending all the time possible in her car. The fresh air and sunshine of Spring are most wonderful tonics.

A change has come over the spirit of our fashions, a change which is as agreeable as it was unexpected and which is particularly appropriate for motoring raiment. Motoring fashions are today just as important as those for any other sport and designers and manufacturers are devoting much time and thought to motor modes—just as in the same way the motor car is accepted as our every day method of locomotion and causes no consternation by its presence everywhere.

The motor woman may dress this Spring to suit her individual type, but the silhouette must be straight and slender or a trifle fitted in. Among the slogans which are telling us the concrete forms our patriotism should take, to be the most effective, there are none more important than the following: "Wool will win the war, conserve it." This is a slogan which we are urged to accept and to put in practise as greatly as possible. One of the very newest ideas which comes to us is to extend patriotic endeavor to our motoring clothing, but already it has received an enthusiastic indorsement, which speaks well indeed for the patriotism of motor women. The slim silhouette, which will be so strongly featured this Spring, is a splendid example of the conservation of wool, and there are so many new and attractive materials coming from the American looms that regrets will be but few when a visit is paid to the smart shops where all the new materials are displayed. There are, it is said authoritatively, 50,000,000 less sheep in the country than there were before the war began. The lack of transport facilities, of course, greatly interferes with the distribution of the diminished supply of this raw product, and with the enormous quantities of wool demanded by the army we have sufficient reasons to not be ex-

By Mrs. A Sherman Hitchcock

travagant with our garments of wool. I am sure that every motor woman is interested and anxious to assist the government in every way within her power, and suggestions which give a concrete method by means of which she may be of real assistance are, I am confident, very welcome.

Velour is one of the most popular materials for the Spring motor coat and every woman is probably familiar with



Here is the newest of the new and something which will interest every motor woman, for all motorists desire a capacious bag and what woman does not most ardently desire a parasol at the beach or other resort when she alights from the car? Here is the "Bagasol," giving ample proportions when used as a bag, and most serviceable, smart and attractive when doing duty as a parasol. (Courtesy Polan, Katz & Co., Baltimore, Md.)

this lovely material of velvety softness. The Palmer Garment Coat shown is a very representative model of the new mode, conserving wool in its slim silhouette and still maintaining the best liked features of fashion. Polret twill, tricotine, serge, duvetyn and army cloth are all up-to-the-minute materials, bound

to give satisfactory service and excellent style. A new model, called "Bolshevik," has, in a general way, the effect of a Russian Coat. It is made of khaki serge, lined with a charming Pussy Willow Silk. The shoulder parts are cut in one with the front and a corded belt fastens the garment. An excellent motor coat is made of beige loopine and has a back yoke of the new fibre silk jersey. The yoke is wide enough to roll back deeply on itself, forming a collar and also long enough to be stitched down on both sides of the front in stole fashion. The shoulders are long and the coat is unbelted except at the sides, these held by tabs which meet there, the tabs being waistline extensions of front and back sections. A very chic model is of Emerald green fibre silk jersey and is a slip-over, featuring a long stole of white fibre silk jersey at the right side, which is wound around the waistline and slipped through itself to form a girdle and sash. The coat is shirred under a yoke of the white, which is one-piece with the roll back collar of the stole. The fibre silk jersey in both above mentioned coats is the very new and smart Rodier quality. It is the highest type of cloth in its class and far surpasses the imported cloths, both in workmanship and finish. It is very beautiful in texture and makes stunning coats, suits, frocks or sweaters for the motorist. There has been a great objection heretofore to knitted fabrics on account of their tendency to curl when cut, but that has been entirely overcome in the Rodier quality fibre silk jersey. It is manufactured from the very best quality bleached fibre silk and therefore eliminates at the beginning much of the hairiness and fuzziness common to this class of material, and is knitted with the greatest care so that all imperfections will be reduced to a minimum. The result is a most admirable fabric, which will appeal very strongly to the motorist of discrimination. It is being featured at Palm Beach and worn by all the leaders of fashion. It may be had in the following new and attractive shades: Cantaloupe, taupe, blege, pearl gray, sea gull, tan, navy, green, cendrilla and black and white. The motor woman cannot go wrong in her selection who makes that selection Rodier quality cloth.

Motor cape coats are being shown which are the acme of practicality. Real military cloth is used for these models and the ripple cape is detachable and the big cape underneath is fastened with four large buttons which enables it to be worn buttoned up to the chin, or as a surcape over the larger shoulder cape. The large mannish slash pockets are cleverly emphasized with big stitched flaps, button trimmed. The buttons used are of da^{br} mother-of-pearl and are about the size of a silver dollar.

There are many original novelties being brought out for the motorist and one



A "Patrick" is something entirely new for the motor woman and this model is built precisely on the same lines as a man's coat, combining excellence of fabric with beauty of workmanship and serviceability. It is particularly adapted to wear over the coat suit or with the sweater. Made in high and standard colors to suit the taste of every woman.
(Courtesy F. A. Patrick & Co., Duluth, Minn.)

that combines practicability as well as the very attractive Bagasol, which is illustrated herein. Every motor woman who ever made a trip to the beach or to any outdoor affair on a spring or summer day when the sun is shining warmly and brightly has longed very ardently for a parasol and has many times been most uncomfortable without one. The ordinary parasol is not convenient for motor use and is seldom carried. The new Bagasol, therefore, will fill a long felt want and bids fair to achieve a decided popularity among motorists. When it is closed it forms a wonderfully attractive bag with ring handles and will really carry quite a remarkable number of articles, and when opened is one of the most charming parasols imaginable—so that the Bagasol is very serviceable in two capacities for motor use. It is an article that would be equally serviceable for any other time as well, for it is so handsomely made that it is an addition to any toilette. There is an entirely new type of parasol, called the "Ever-Ready," which is very appropriate for use in the car and is being used at the southern resorts at the present time. They are made of silk gingham and can be used in either sun or rain, hence the name "Ever-Ready."

At the present time small satin motor hats, often of turban shape, promise well for the first warmer days or for the bright sunshine which often accompanies the last days of winter. They are hung with chiffon cloth veils in a fashion which motor women have always liked. The veil hats for motoring which were worn a few years ago were most practical and charming and were decidedly popular until they were adopted by the large majority of non-motorists and our streets appeared to have an endless procession of Oriental widows. The new veiled motor hat is a more discreet affair, forming a narrow silhouette. A small mushroom shape is made of Aviation blue Roshanara Crepe and has a veil of the same color attached, the veil being run through its hem with an inch wide black faille ribbon with picot edge and the same ribbon forms a large rosette at the back of the crown. Hats



A coat of Nutria fur is especially appropriate for motor wear at this season of the year. This model has a belted waistline fastening with a buckle, the belt forming into novelty pockets. The shawl collar may be worn as shown, or brought up high about the neck and fastened. The motor turban is both smart in shape and also practical and will resist wind excellently.
(Courtesy Franklin Simon & Co., New York City.)

of hand crocheted fabric straw are seen with veils to match, with brown being given the preference in color. Some of the most attractive motor hats are made of leather, while the new chenille hemp is particularly smart. I can especially recommend these chic little hats of gage design and make and they seem to possess an exclusive and becoming air that is really difficult to find in any other design. Particularly appropriate motor models in the gage line are the Moline, Girad, Lisbon, Brighton and Janice. These models are all of chenille hemp and in such attractive colors as cherry, khaki, taupe, sand, rose and purple. Ribbon bows and very attractive ribbon ornaments are used as trimming. The gage models have the unusual feature of

being becoming to almost all women and the materials utilized in their making are of such excellence that long life and continued shapefulness is assured.

Ribbon of all kinds, all widths and all colors, will be used to a very unusual extent this spring. Motor hats will be made entirely of ribbon and little Dutch bonnets of ribbon will be popular with the motorist. The most novel and charming of all ribbon creations is the very new sweater knitted entirely of very narrow ribbon, and next time I am going to tell you more about this very attractive garment. The motorist may now knit woolen sweaters for the army and navy and for herself a sweater of silk ribbon, thus helping the wool conservation and showing her patriotism.

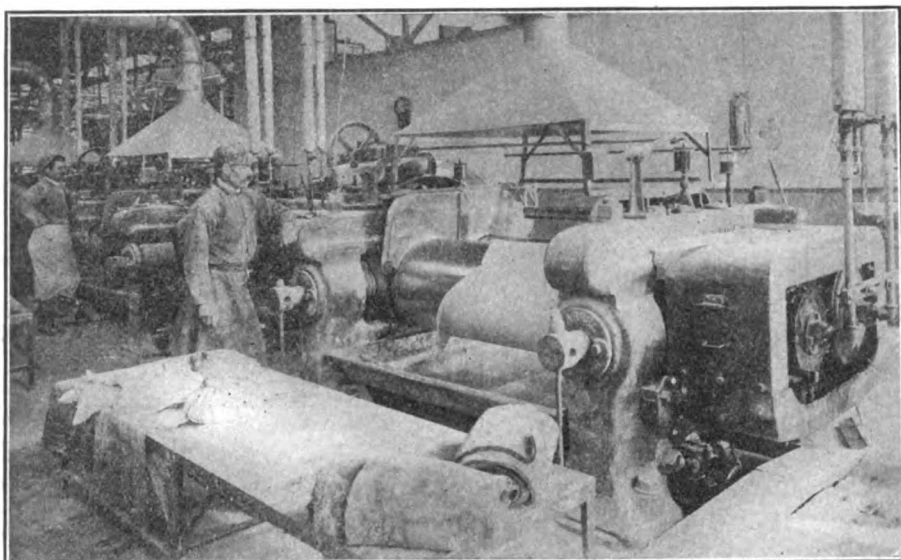
Veils have again become a prominent element of the motoring costume and those of the lovely Slendora Crepe and Indestructible Voile are particularly lovely and distinctive. Slendora Crepe is a new transparent silk, made original and exclusive by the irregularity of the cross threads in the weave. It is much newer than Georgette, beside being much stronger. It drapes unusually well and is ideal for motor veils. The Indestructible Voile is similar to a chiffon in weave, but is possessed of wonderful wearing qualities.



One of the newest of our 1918 Spring models for motor wear is this "Palmer Garment" Coat. Made of Sammy velour cloth, with convertible collar and cuffs of harvest velour cloth. The belt and pocket laps are finished with silk twist stitching and the back is the modified empire type, trimmed with fancy buttons.
(Courtesy Percival B. Palmer & Co., Chicago, Ill.)

HOOD TIRES

Scientific Production of Highest Quality in Ideal Plant



Mixing the Rubber Compounds That Are Used in Making the Treads, Covers and Side Walls of Hood Tires—The Initial Process of the Factory.

AUTOMOBILE tire making as an American industry has reached very large proportions, the estimate of the National Automobile Chamber of Commerce, which has least approximate figures, that in the year ending June 30, 1917, it produced 18,000,000 tires, valued at \$450,000,000, being reasonably conservative. Automobile vehicle builders, during the same period, produced 1,806,194 machines of all kinds. The car and truck registration of July 1, 1917, was 4,242,800, of which probably two per cent. is duplication. With liberal allowance for shrinkage probably 4,150,000 vehicles in round numbers were in use on the date specified, of which 3,750,000 were passenger cars and the other 400,000 were used for freightage. During the last six months the total registration has been considerably increased, but this has not been estimated.

Allowing a set of four tires each for all new cars and trucks, vehicle manufacturers took 7,224,776 shoes, and a liberal allowance for other uses may have brought the total sold to industrial enterprises to 8,000,000. The remainder of the production was for renewals and for stocking dealers and branches of tire makers. Whether the 1918 output will be as large is problematical, but there is probability that it will not be decreased.

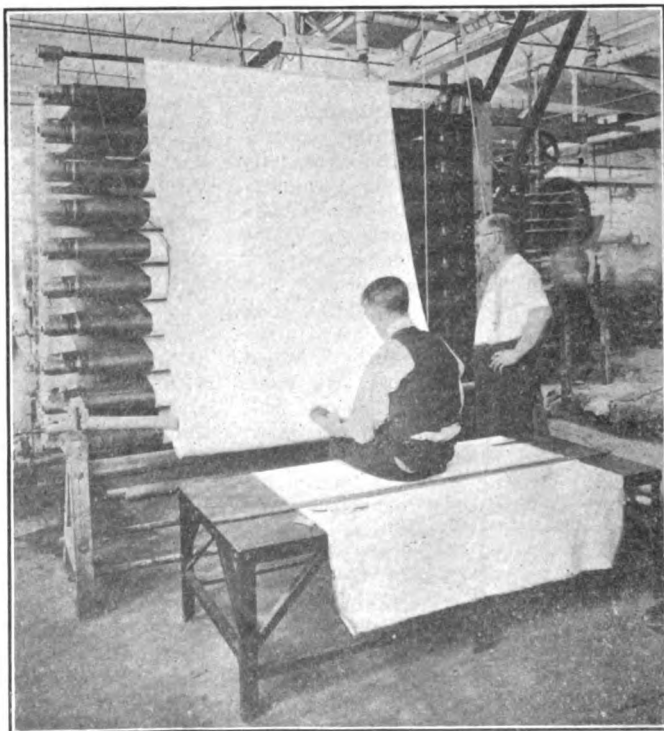
The magnitude of the industry prob-

ably exceeds the belief of even those well informed concerning it. Some of the concerns engaged in it are very large. These have applied scientific methods, having physical and chemical laboratories for research and experimental work and every necessary facility for perfecting designs and manufacturing processes to obtain tires that shall have greater endurance and longer service life.

Tire design is not in the least uncertain. Form and construction have been determined by careful engineering. The load that is practical for a tire of given size can be very accurately determined, and proportions that afford the best results in laboratory and service are usually pro-

duced. Science is applied to tire manufacture as it is to any other highly specialized production, but research is constant because there is a desire to improve the product so far as is possible. There is no reason to believe that tire design can be materially perfected because this has been developed by engineering, as will presently be shown, but without exception every research engineer of the industry is hopeful that he will find what will insure better tire quality through use of ingredients in the compounds of rubber and by new methods of vulcanizing or curing.

With reference to tire design, the basis is the compressibility of air, for the structure must have certain form and strength. Directly upon the content of air, measured in cubic inches depends the resiliency of a tire, and this air content is practically dependent upon the size of the wheel and the rim that is used upon it. The pneumatic tire sizes ordinarily selected for automobile equipment are not determined with the purpose of obtaining the greatest tire econ-



Inspecting the Fabric: All Cloth Is Examined Before a Battery of Lights to Detect Imperfections That Would Weaken the Tire Structure If Not Rejected.

omy in service life. Cost of initial equipment is a considerable factor, and the smallest size that will carry the load is usually purchased by the vehicle manufacturer. In some instances shoes that are larger than the average for a given weight of machine are chosen, but such instances are infrequent.

Oversize Tires Margin of Safety.

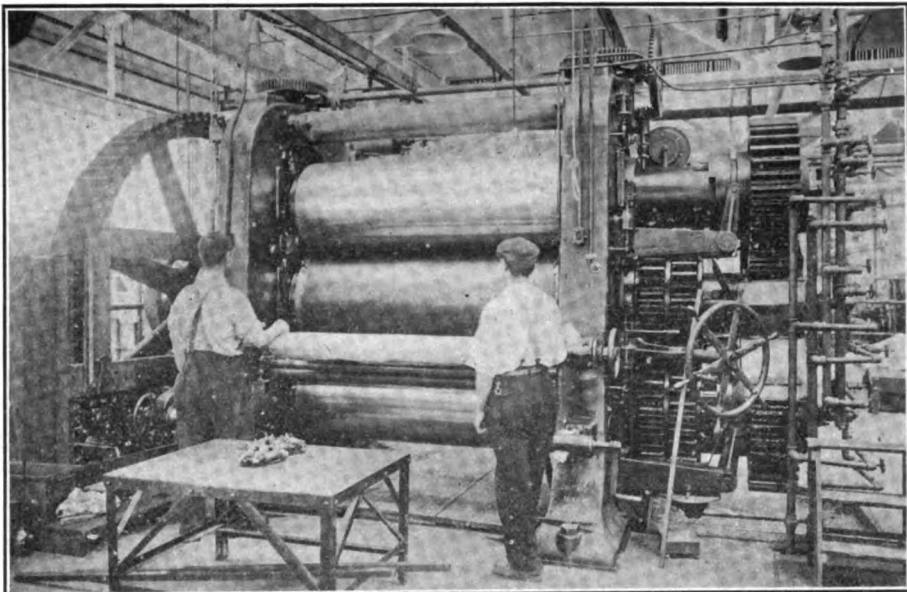
As a rule oversize tires will afford much longer service life than sizes that have smaller margin of safety. By this is meant that the larger tire will have more plies of fabric and greater thickness of rubber compound. It will necessarily be stronger and wear longer, and naturally as it is not subjected to anything like the stresses of the smaller tire it will endure practically in ratio to its excess of strength. The oversize tire will cost more, but the service it will afford will be so much greater that the actual expense, based on miles driven, will be less than were a smaller tire used.

Reference is made to oversize tires for the purpose of establishing that service life is dependent upon the strength, the thickness of the structure, the inflation pressure and the load carried, and obviously the construction that will be least stressed will endure the longest. The work that can be done with a tire is very accurately determined by the engineer who designed it, and he can fix limitations for inflation pressure and for load quite as surely as the capacity of any structural material can determine its endurance under weight or pressure of any nature. Not only this, when limitations have been established these should not be exceeded. The buyer who assumes that he can ignore the standards of inflation pressure and load weight recommended by the engineer is as surely inviting destruction of his property as though he cut or punctured or otherwise damaged it deliberately.

Pneumatic Shoes the Rule.

The pneumatic tire produced by practically all manufacturers is built with a structure of fabric covered with rubber compound, and while some makers are building shoes with diagonally meshed strands instead of fabric, these being the "cord" types, so-called, these are as yet but a comparatively small part of the production of the industry. Cord tires are regarded as having great resiliency, which is claimed to make for ease for occupants of passenger vehicles, but if damaged, and there is no claim that they are not more vulnerable, they cannot be as practically repaired, at least to have the same service value that is obtainable from a fabric structure. The purpose of this article, however, is not to discuss the relative merits of tire types, but to deal with some characteristics of design and to show why tire making is not only scientific, but has been perfected with greater care than is usually given to industrial production.

First of all tire manufacture is engaged in by a comparatively small number of concerns, some of which are extremely large. Tire production cannot be undertaken without machine equipment, which must be specially built, is



Rubberizing the Fabric: All Perfect Cloth Is Impregnated with Rubber and Then Both Sides of It Are Coated, Making Highest Quality Material Used in Tires.

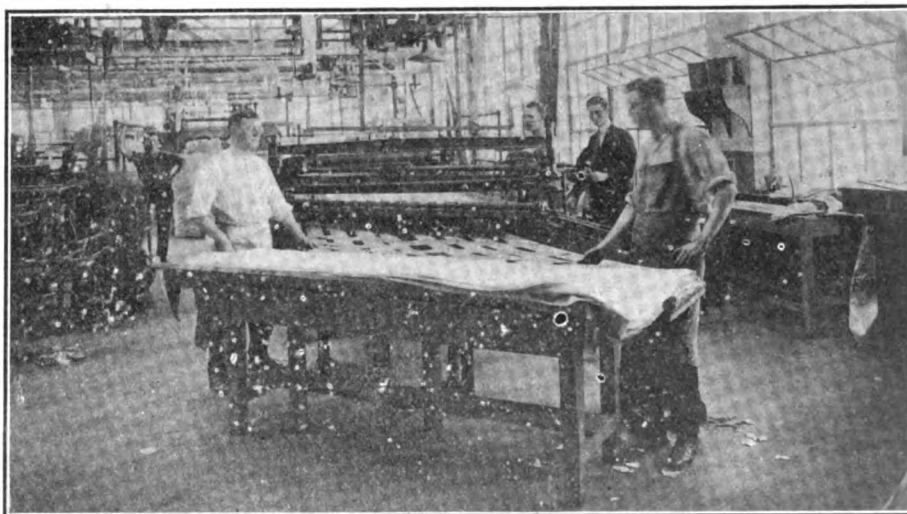
very expensive and necessitates heavy initial investment. Tire machinery, however, is practically useless without expert knowledge of compounding rubber into grades that will best endure the wear of vehicle service, and equally comprehensive experience in "curing" or heat treating it to obtain the largest measure of strength and resistance to use. Tire manufacturers maintain splendidly equipped laboratories in which chemical and physical tests are made, and these must be operated by experienced chemists and engineers who devote a great deal of time to research and experiment for the purpose of perfecting the quality of the compounds and the methods of constructing and vulcanizing the tires. In addition to the laboratories and their chemical and engineering data, service tests are made, tires being driven under careful observation to determine results from road use.

Importance of Science in Industry.

One will understand that the utmost importance is attached to laboratory and

engineering work by all tire manufacturers. Any change of compounds or treatment or methods is first carefully experimented, the tests often extending over long periods of time, so that there is absolute knowledge of results, and their value is positively established before they are accepted as desirable for manufacture. In any event all development is systematic and nothing is neglected that promises a worth while result. A great deal of attention is being directed toward the compounding of rubber and treating it, for there is universal desire to obtain a still greater degree of endurance under wear.

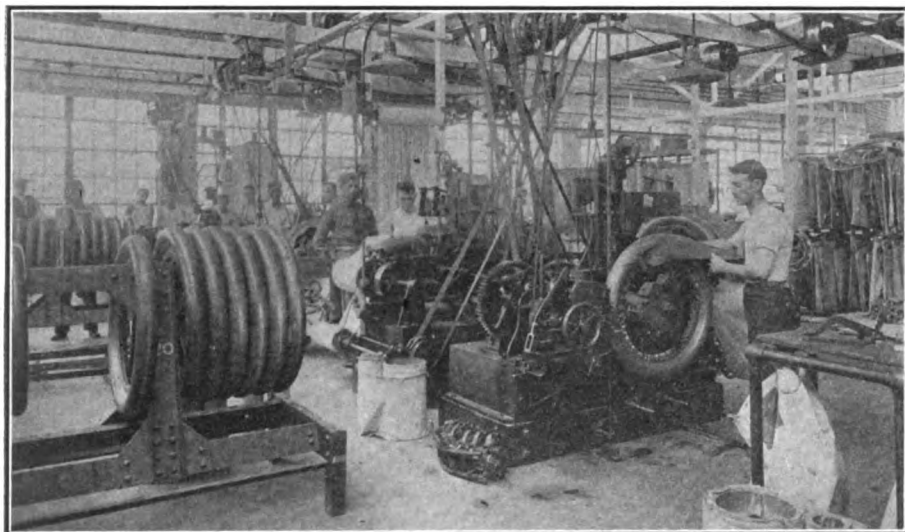
Rubber in its purest state is elastic and can be distorted under compression and it will assume its original form when released. The strength of rubber is dependent upon its fiber, and this fiber is strongest when there is the least volume of any substance that will harden it or lessen its elasticity. Obviously the rubber must be hardened so that it will not distort beyond a certain point



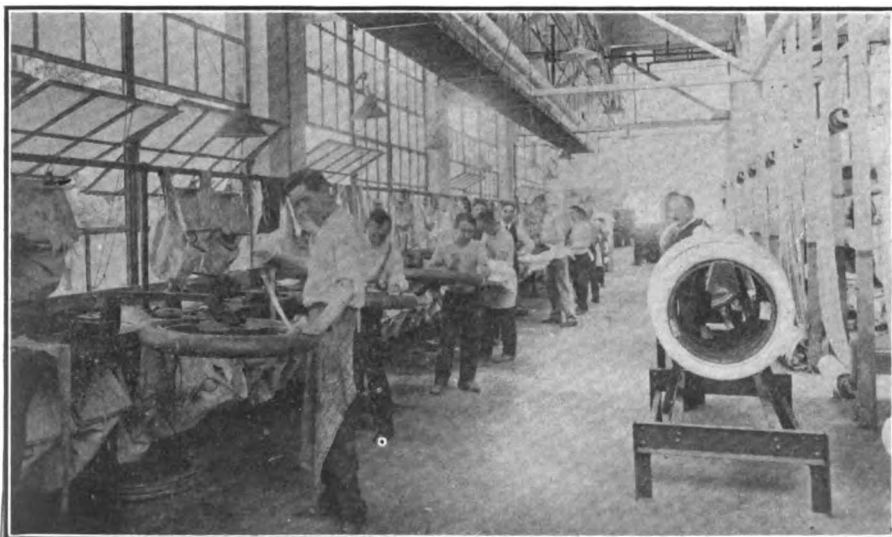
Cutting the Fabric: The Frictioned and Coated Cloth Is Cut Bias to Have the Threads Diagonal Across the Carcass of the Tire, This Insuring Even Tension Upon Them.



Splicing the Fabric: The Strips of Cloth Are Lapped $1\frac{1}{2}$ Inches and Cemented, and Marked for Length of Plies, Each Roll Containing Sufficient Material for One Tire.



Carcass Making: The Tire Is Formed on an Iron Core and the Fabric Tensed Evenly and Gathered at the Beads by Fingers and Rolls, Half the Carcass Being Made Before the Beads Are Inserted.



Carcass Covering: After the Carcass Is Formed of Fabric and the Beads Are Enclosed the Tread and the Side Walls Are Covered with Cover Stock of Compounded Rubber.

under pressure, and rupture or disintegrate when subjected to strains from the application of power at the wheels at the point where they contact with the road or other surface.

Perfecting Rubber Compounds.

Since pneumatic tires were conceived and built the manufacturers have directed no inconsiderable part of their organization toward improving the quality of rubber as compounded to have greater resiliency and endurance, and while the public may believe that the qualities that are standard are perfection, the manufacturers are very hopeful that much greater improvement is practically possible. But in any event the progression is slow and the results of research and experiment of each individual concern is carefully guarded. As a matter of fact manufacturing processes differ somewhat, and while the general principles are similar, the "compounding" or mixing of ingredients of stock is not known, and is regarded as industrial secrets on which are largely dependent the success of the concern.

The engineering principles, however, are practically standard, and these are applied by engineers to obtain results that are regarded as desirable or sufficient, so that their application is dependent upon the knowledge of the engineers and their experience with the requirements for service.

Basis of Tire Engineering.

The basis of tire engineering is the use of air under pressure to inflate it, and for that reason two main principles are involved, first, the degree of pressure, which is dependent upon the air chamber or tube, and second, character of construction that will best endure with a given inflation. This applies, of course, to a given size of tire. A tire is usually specified by two diameters, the first of which is the tire diameter (measured across from tread to tread), and the second the section diameter (measured by the width of the tire outside), which is usually expressed as 32 by 4 inches, to illustrate. A 32 by 4-inch tire is intended to fit a rim 24 inches diameter; a 34 by 4 on a rim 26 inches diameter, and so on. Pneumatic tires range in size for passenger cars from 30 by 3 to 38 by $5\frac{1}{2}$ inches. There are in some instances smaller or larger sizes, but these are not ordinarily used.

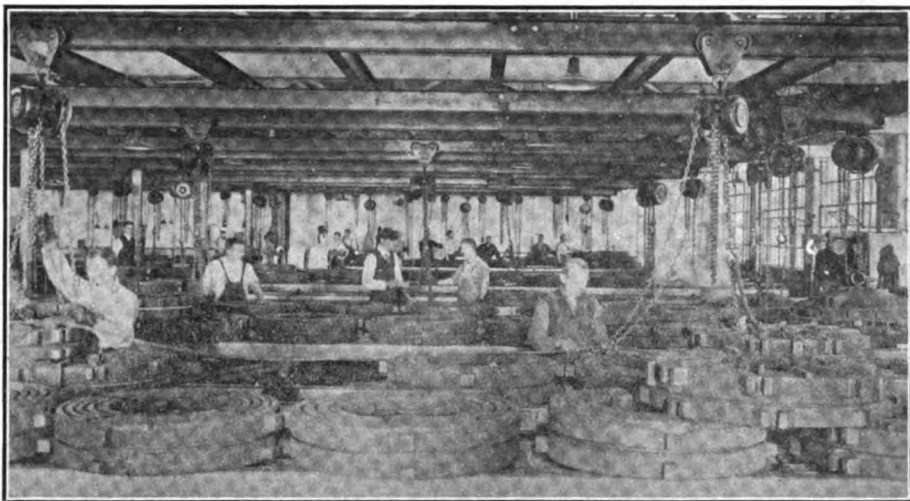
The tire size depends upon the wheel rim, for the cross section diameter cannot, with a given width of rim, exceed a standard figure, because excess width will project so far that under load the tire will be cut by the rim. If the tire had greater depth than width, when compressed under load the sides would project on either side of the rim. The limits of cross section diameter with reference to a given tire diameter are exceedingly close. For this reason the width and height of the cross section being limited, the air content, measured in cubic inches, is similarly restricted. As the tire is compressed under a load the pressure is distributed equally on all parts of the tube, and assuming a given

load the pressure upon the tube is in ratio to its size. The air content is determined by multiplying the square inch area of the inside cross section of the tire when placed on the rim by the circumferential length at the centre of gravity, which is approximately the centre of the tire. Generally speaking practically all tires have about the same air volume for a given size of rim.

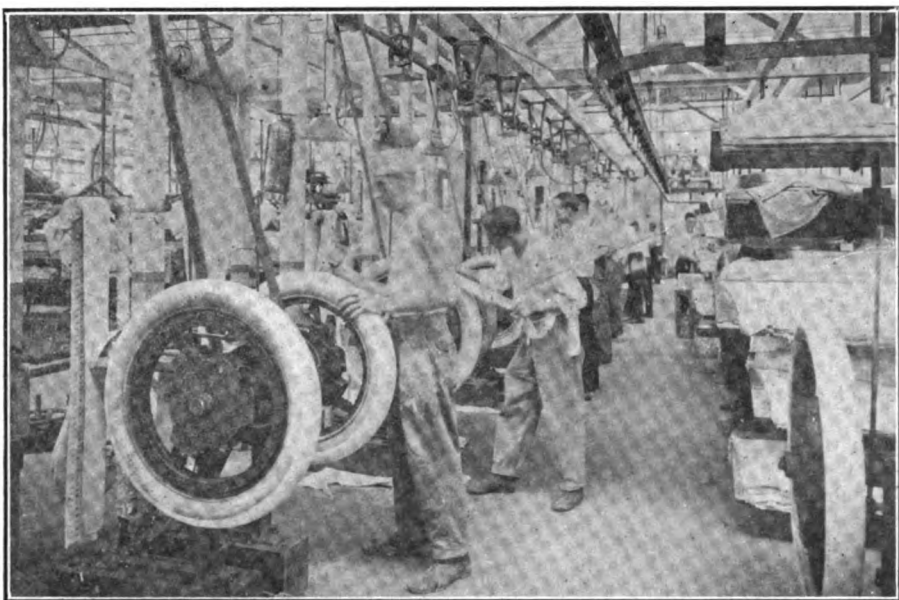
The tire inflation pressure is determined by inflating it to varying pressures and subjecting it as inflated to varying loads and noting the compression as indicated by the area of the tread contacting with a surface. This can be done with the tires on vehicles, but it is usually done by mechanical means so that there will be no variance. From these results graphs may be made that will show exact data for inflation pressure. The tire will expand to a perfectly round cross section under pressure, because the elastic air expands equally in all directions and the contact area will depend entirely upon the load. The less the air pressure the greater the contact area. Varying the inflation pressure or varying the load will vary the contact area, but obviously there is but one standard by which the inflation pressure can be determined with any degree of certainty.

The manufacturer fixes a maximum pressure for inflation, which has been determined very carefully. There is a limitation to the load that can be carried on a given tire. The side walls of the tire will flex under load and it will become flattened. If the width of the tire under the wheel exceeds by 10 per cent. the width of the tire on top of the wheel the load is greater than can be carried in safety, that is, with regard to the endurance of the shoe. By this is meant that if a tire has a cross section diameter of $3\frac{1}{4}$ inches and it measures under a given load where it contacts with the road not more than $3\frac{27}{32}$ inches, it is not loaded beyond the limit of safety, but if it measures $3\frac{28}{32}$ it is too heavily loaded. In such an event there would be two courses open, the one to increase the inflation pressure until the cross section measured less than $3\frac{28}{32}$ inches, or to reduce the load until the same result were obtained. But if the maximum inflation pressure has been reached there is no alternative than to lessen the load upon the tire until the width of the cross section carrying the weight is $3\frac{27}{32}$ inches.

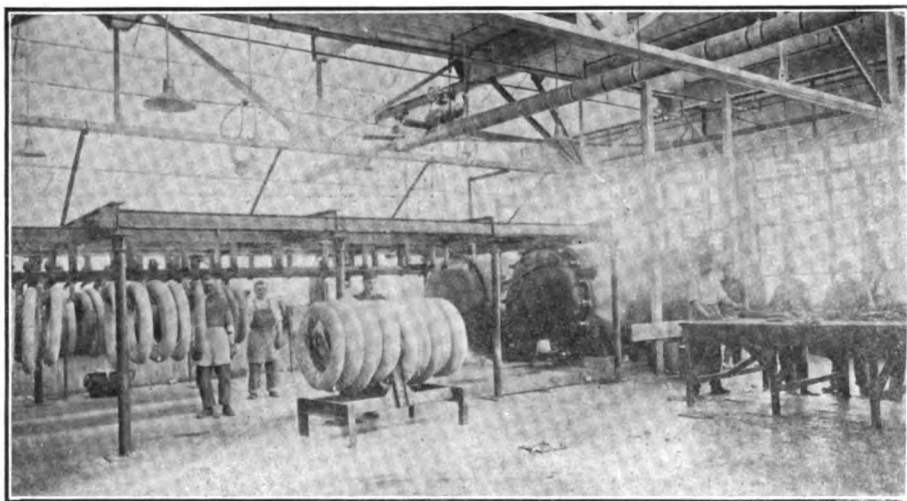
The reader should understand that all tire engineers agree that the load carried by a shoe inflated to maximum should not increase the width of the cross section carrying the load more than 10 per cent. The figures quoted in the illustration are the nearest that can be given in inches without the use of decimals. Obviously the exact measurement would be .35 inch, and $11\frac{1}{32}$ inch, which has been stated as the limit, is .34275 inch, which is approximately correct. The reader should also understand that innumerable tests and experiments have proven that this 10 per cent. increase of width of tire cross sec-



First Vulcanizing: When Covered the Carcass Is Placed in a Mould the Exact Shape of the Tire Without Tread and Vulcanized at a Temperature of 286 Degrees to Completely Consolidate It.



Treading: Following the First "Cure" or Vulcanizing the Tread Is Carefully Applied with Cement Without Stretching, the Ends Being Joined, This Being the Last Construction Work.



Second Vulcanizing: The Tire, with the Tread Wrapped with Canvass by Machine Is Given the Second "Cure," Which Unites the Rubber Covering the Carcass Into One Piece.

tion is the maximum, that if this width is exceeded the side walls may be rim cut and there is strong probability that the fabric, which is impregnated with rubber and held by the compound covering it, will be broken. These results will follow in any event a continued use of the tire that is overloaded.

While the tire structure as a whole will yield and flex when inflated to maximum, it is protected by the air content which prevents the side walls bending so sharply that the fabric will break. A

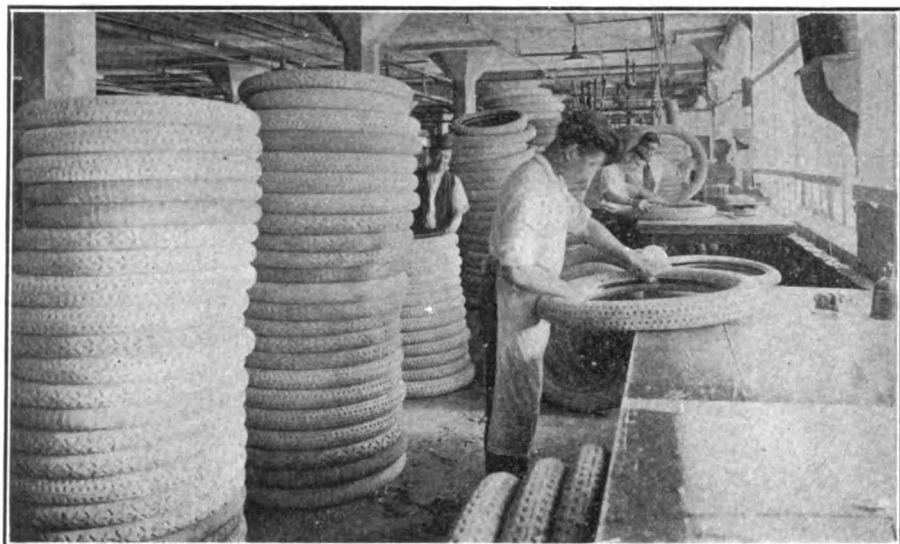
as they are used with sufficient air pressure that the static load upon them will not compress the cross section contacting with the surface so that the width is more than 10 per cent. of the normal diameter there can be no danger of damage from rim cutting or breaking of the fabric of the side walls. In other words, the tire that is not loaded to its capacity can be used with reduced air pressure, and the standard by which either load or inflation can be determined is measurement of the cross sec-

vehicles will equip them with shoes that will just carry the estimated load, because larger tires will cost more, and when the equipment is increased, which is very frequently the case, or more passengers than there are seats for are carried, the total weight is excessive. If the tires are driven with reduced pressure the side walls of the tires are excessively flexed. One should remember the tire has very narrow limits of cubic inches air content if it will just safely carry the rated load, and deflation is extremely probable. For this reason frequent examination, preferably with a jawed slide rule, or with a pressure gauge, is not only desirable, but necessary if the owner wants to obtain practical tire economies.

When recommendation is made by the representatives of a tire manufacturer to a purchaser with reference to the capacity of shoes, the uses that can consistently be made with them, how they can be protected and how greater service can be obtained, there is no desire to place limitations on a vehicle owner or driver. The tire engineer knows what is best and he has advised what is told the buyer, simply that the customer will have the greatest degree of satisfaction at the least expense. If the purchaser ignores the advice given he is the loser.

The Ideal Hood Tire Plant.

Statement has been made that tire manufacture is with regard for well established engineering principles. There is no better illustration of the industry



Inspection: The Final Examination Determines the Quality, for the Tire Must Be Perfect to Pass, and It Is Trimmed and Painted Inside if It Is Up to Standard.

30 by 3-inch tire will have an air content of about 400 cubic inches, a 30 by 3½-inch tire 545 cubic inches, a 34 by 4-inch tire 745 cubic inches, a 36 by 4½-inch tire 1000 cubic inches and a 38 by 5½-inch tire 1640 cubic inches. This statement is made to show that the cubic inch air content increases very rapidly with the increase of the tire size.

All Depends on Air Content.

The resiliency of the tire depends directly upon the air content, upon the inflation pressure, and upon the thickness and consistency of the carcass and the tread material. As the air pressure is equal upon all parts of the tire walls it is increased or decreased as the load is varied. The lower the inflation pressure upon the tire, so long as the width carrying the load does not exceed 10 per cent. of the normal width of the cross section, the greater will be the margin of safety. By this is meant that if a maximum inflation pressure is fixed at 80 pounds, and this can be reduced to 55 pounds and the cross section carrying the load not exceed by 10 per cent. the normal width of the tire, the vehicle will ride easier and there will be a very material reduction of the stresses upon the shoe. The greater the inflation pressure the more the resiliency is reduced.

At this juncture emphasis may be made upon the use of oversize tires, or shoes that will not be loaded to capacity. These will have excess resiliency because they are not inflated to maximum, and they will endure longer because they are stronger structurally. So long



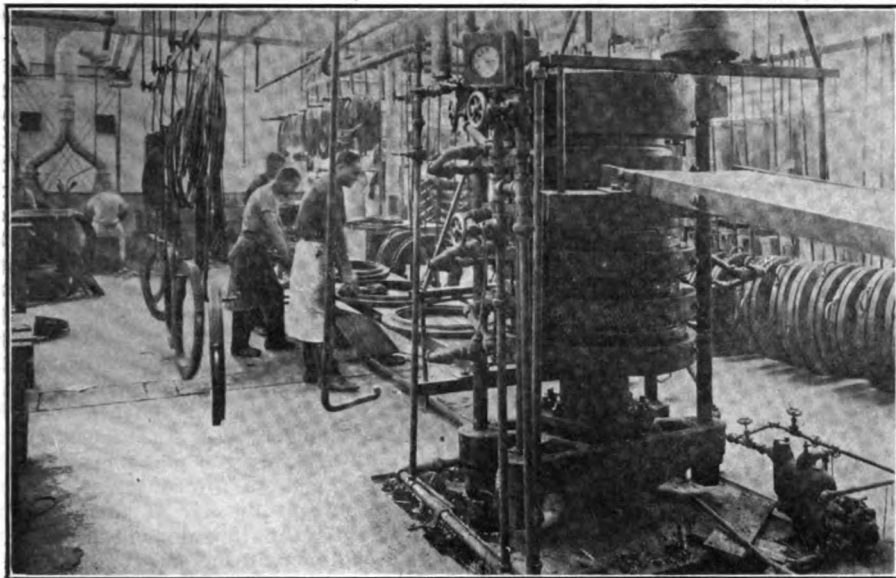
Shipping: The Perfect Tires Are Sent to the Shipping Room After Inspection, Where They Are Wrapped in Paper, Marked and Stored Until Requisitioned for Shipping.

tion. This may be made with a caliper or a rule having a fixed jaw about four inches length at one end and a sliding jaw, the reading being made between the jaws in inches or by simple marks that will indicate the normal width of the cross section of the tires of a vehicle and the maximum of 10 per cent. additional.

Why Tires Are Often Overloaded.

The reason that tires are frequently overloaded is that the manufacturers of

than the splendid new plant of the Hood Tire Co., Inc., Watertown, Mass., which is claimed to be the best of the kind in the country. It is not the largest, but the buildings are specially built, all the machine equipment was constructed purposely for the company to produce specific types, and the workers can produce tires and tubes with exceptional economy of time and labor. Much thought was given to obtaining highest grade production so far as machine and tool



Bead Making: The Beads Are Hard Rubber, Some Containing Wire, That Are Made in Standard Lengths by Machine and Go from This Department to the Carcass Making Room.

equipment is concerned, and the sanitation, lighting, heating and arrangement of the buildings for the convenience, comfort and health of the employees were given equal attention.

The design of the tires and the compounding of the rubber and the manner of constructing the shoes have been carefully perfected by the engineers and the laboratory with the purpose of obtaining a very high quality. Claim is made that Hood tires cost more than other makes of shoes, but this higher cost is justified by the materials and the workmanship, while the design insures unusual endurance. The company produces now about 1100 pneumatic shoes and about 1500 tubes each working day, and in another department produces about 150 solid tires for freight vehicles a day. The capacity of the plant is being steadily increased and seemingly the only limitation is the production capacity of the workers.

Succeeded Shawmut Tire Co.

The production of tires was begun in 1906 at the plant of the Hood Rubber Co. by the Shawmut Tire Co. of Boston, which rented space and facilities from the Hood company, and the Shawmut company operated until 1914, when its activities were discontinued. The Hood Tire Co. was organized to succeed the operations of the Shawmut company, but in 1912-3 experimental work was carried on to develop Hood solid tires. Later on attention was directed to pneumatic tires, and so the Hood company practically continued the operations of the Shawmut company, but the products were known as Hood tires. The company developed rapidly and production was so limited by lack of space that the present plant was determined and building operations, begun in November, 1916, were completed in June, 1917.

The plant now occupied is across the Boston & Maine railroad tracks, from the main works of the Hood Rubber Co., and opposite the United States arsenal. The building devoted to pneumatic tire

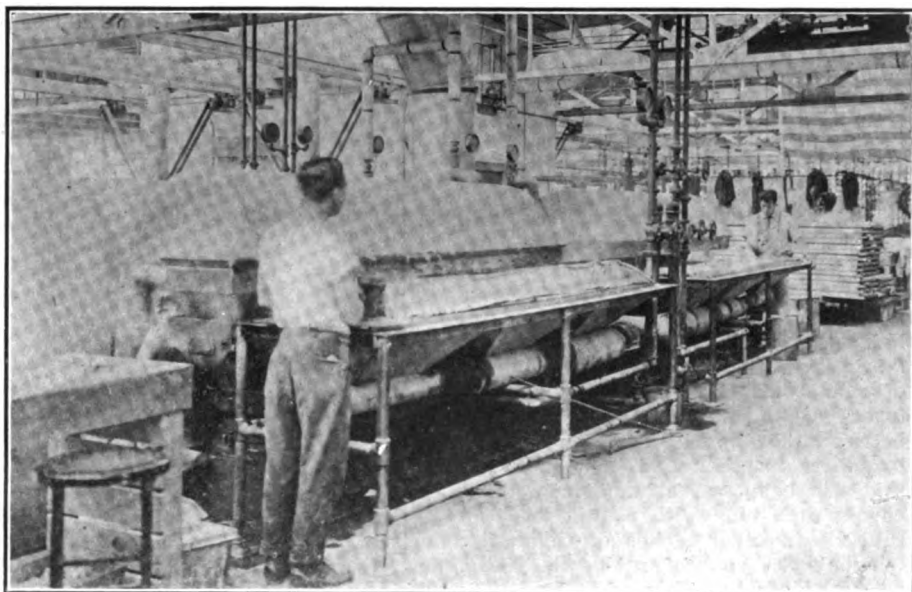
making is fireproof, constructed of brick, stone and steel, with saw tooth roof that is so trussed that there is not a post supporting it and the floor is absolutely clear. The structure is one story for approximately half the length and two stories for the remainder, the floor having an area of about 100,000 square feet. The side walls and one angle of each tooth of the roof are mainly steel sash, so that the interior is exceptionally well lighted. The only partitions are those enclosing the vulcanizing departments, which are separate. The employees have large locker rooms, admirably equipped lavatories and unusual care has been taken to insure a supply of drinking water.

Production System Is Progressive.

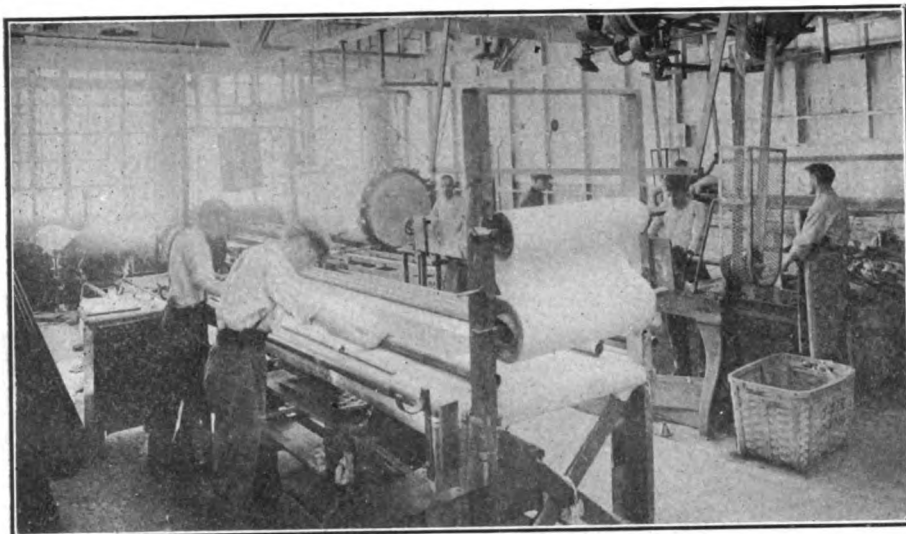
The arrangement of the machinery in the building is progressive, that is, the manufacture starts with the mixing of

the rubber compounds and fabric inspection passes successively through the calendering, fabric cutting, splicing, carcass making and covering to the vulcanizing room (where the first cure is given), and from the tread and bead making departments to the treading department (where the tires after the first cure are finished by the application of the treads), to the vulcanizing room, where they are given the second cure, without rehandling or unproductive work. Following the manufacture the tires are inspected and made ready for the sales department, being sent to the stock room in the basement, from which they are drawn as required by the shipping department, which is in this part of the building. The progressive system means economy in handling and minimized cost of labor as the work goes through the plant, it being delivered by each department where it can be most advantageously worked upon. Beginning with the preparation of the materials, which is followed by the different processes, the work progresses until the tires and tubes reach the shipping department without confusion or unnecessary labor. Much of the machinery operated by the company is used exclusively by it, and a considerable degree of the strength and uniformity of the work is claimed to be due to the machines on which the carcasses are made.

The pneumatic tires made by the Hood company are in two grades, the highest quality being Hood tires and the second grade Puritan tires. These are made both round and "Arrow" tread, the latter being a figured tread intended to minimize skidding. The designs of these tires are practically the same, but the main difference is in the quantity and quality of the materials. The company will begin March 1 the distribution of a new type of the Hood grade, which will be known as "Ribbed Tread," which will have a specially moulded



Tread Making: The Treads Are Formed of Laminations of Rubber Stock in Different Lengths That Are Vulcanized Together, and Are Made Separate from the Carcasses.



Tube Making: Sheets of Rubber Stock Are Wound Three Times Around Steel Tubes, Covered with Thin Fabric, Wound Spirally with Tape and Vulcanized by Heating with Steam.

tread of exceptional thickness, which will be divided into three approximately equal sections by two deep circumferential grooves. The tread surface is designed to give the least traction resistance on the road, commensurate with carrying the load. The tire is intended to steer extremely easy on front wheels and coast with the least road resistance, materially saving in fuel consumption. With reference to design the purpose of Hood engineers has been to have what is practically a circle or a round cross section inside of the casing. Claim is made that a tire that will have as nearly as possible the form it must have when fully inflated will endure longest so far as fabric strains are concerned.

Quality of Hood Materials.

Hood tires are constructed with fabric made to specification that must be rigidly complied with, of Sakellarides cotton, and while this has strength of 390-430 pounds to the square inch as it is delivered from the mill, it will in the completed tire have a strength of about 242 pounds to the square inch. The fabric, which must be absolutely free from moisture before it is frictioned, will lose from 38 to 43 per cent. in strength when dried. By strength in pounds is meant the weight that will cause the fabric to break. Much care is taken to have the thread tension exact and no cloth in which there are imperfections is used, this insuring uniformity of strength. The cloth is carefully inspected before it is used by reeling it past a battery of lights that will show every defect. The fabric is frictioned which is the process of running it through a machine that forces plastic rubber into all of the voids between the threads, causing them all to adhere together, and then is coated, this also being a machine process that covers each side with a thin sheet of rubber. In other makes of tires after frictioning a coat of rubber is placed on one side only. Thus with Hood tires there is a heavier layer of rubber between the plies of fabric.

The fabric is handled in rolls and these

are run through a machine and cut on a bias of 45 degrees into strips of varying width, the cutting being to have the threads extend diagonally in either direction across the tire. In forming the carcasses of the tires the fabric is stretched on the centre or tread of the shoe and is gathered together at the beads so as to cover the entire section and have as nearly even tension as is possible. The sections of fabric are spliced with laps of $1\frac{1}{4}$ inches into lengths that are sufficient to make the number of plies required for a given size of tire, the cloth being wound around the carcass circumferentially. Each strip is marked for the exact length of each layer or ply and each roll of fabric will make one casing.

Extra Fabric in Hood Tires.

Hood tires are built with one extra ply of fabric, as compared with other makes, for the 3, $3\frac{1}{2}$, 4 and $4\frac{1}{2}$ inch sizes, two plies for the five inch and three plies for the $5\frac{1}{2}$ inch. The number of plies used for the different sizes are: Three-

inch, four plies; $3\frac{1}{2}$ -inch, five plies; four-inch, six plies; $4\frac{1}{2}$ -inch, seven plies; five-inch, eight plies, and $5\frac{1}{2}$ -inch, nine plies. The tire must resist the initial inflation pressure, the increased pressure from the weight of the load and the variable pressure from contact with road obstructions, and, theoretically, the greater the number of plies of fabric the greater the strength. The Hood tire is claimed to have not only the strength of the best fabric obtainable, but that of the added plies of fabric.

The limit in number of plies of fabric that can be used is the cross section size of the shoe. As the side walls of the tire are stressed under a load the fabric should follow the arc outward, but if there are too many plies the inner ply will be forced inward by the shortening of the arc of the wall, and eventually the threads will break, and this rupture will increase until the shoe is so weakened it will blow out. As the size of the cross section is increased the number of plies can be increased without danger of breaking the fabric. Hood tires are claimed to have the largest number of plies that long service experience has demonstrated can be used safely, and for that reason have extreme strength.

How the Carcasses Are Made.

The carcasses are made on sectional iron cores the shape of the insides of the tires, the fabric being applied under tension from rolls on drums to the cores, which are turned on hubs as are wheels. The fabric is applied to either side of each core and as it is wound from the reel on to the core fingers, exerting a pressure of about 250 pounds force the sides of the strip toward the beads, and rolls thoroughly compact the edges on the beads. The fabric being marked and the worker not being allowed to vary more than $\frac{1}{4}$ inch from these marks exactly registering, the plies are uniformly applied and the tension on each thread is the same. The beads are hard rubber compound, those for the detachable types having wire extending longitudinally.



Tube Buffing: After the Tubes Are Vulcanized They Are Removed and Buffed by Machines to Have the Familiar Finish, So That There Will Be No Possibility of Wear from Friction in the Shoes.

ally to afford strength, which are wrapped with the middle ply of fabric, the cores being removed when half the fabric has been applied to install the beads.

The cushion (the rubber compound covering the fabric along the tread) and the side cover are next applied. These are prepared by machine and are put on without tension. As Hood tires are made with the two-cure process the carcass is then placed in a vulcanizing mould, which is separable and in which is a cavity the exact size of the tire without the breaker strip and tread. The mould is placed in the pit in which it is heated to a temperature of 286 degrees by steam and the halves are forced together and kept in contact by a hydraulic ram under 350 tons pressure. The heat causes the rubber stock to soften and become semi-fluid and it expands with great force, sometimes exuding between the halves of the mould, and by this pressure the rubber and fabric are firmly consolidated. With this process there is no movement of the fabric during the vulcanizing and the original form is unchanged, so that the stresses are equal upon the plies and the carcass has its full strength.

How the Shoes Are Finished.

When the vulcanizing for the first cure is completed the casings are roughened and breaker strip, which is fabric frictioned and covered with rubber on either side, is cemented on. Over this is applied the tread, which is a single section of rubber compound that was built of a number of sheets of stock consolidated by vulcanization. The tire is then wrapped with strips of heavy canvas by machine, which hold the breaker strip and tread firmly against the carcass. The second cure is given when the wrapped tire is placed in a vulcanizer and heated by live steam to a temperature of 286. the heat expanding the compounds and rubber so that they become plastic and thoroughly unite from the pressure of the wrapping of canvas. The second cure is followed by trimming, cleaning, inside painting and final inspection.

As the work goes through the plant, from the selection of the rubber for the compounds, and examination of the fabric, inspections are very frequent to see that no defects have been developed.

Hood tubes are made of either red or gray rubber calendared to a definite thickness and wide enough to be wound three full turns around a steel tube, with reinforcements for the valve bases. The tubes and the turns of rubber are covered with a jacket of thin cloth applied lengthwise, and the whole is wound spirally with tape, the windings overlapping. The tube is then placed in a vulcanizer and heated with live steam, which consolidates the rubber sheets. After removal from the vulcanizer the rubber tubes are removed, measured and cut to length. The valve and fittings installed and the ends spliced by acid process.

Hood Solid Tires Have Same Standard.

The description applies to pneumatic tires, but the Hood solid tires, which

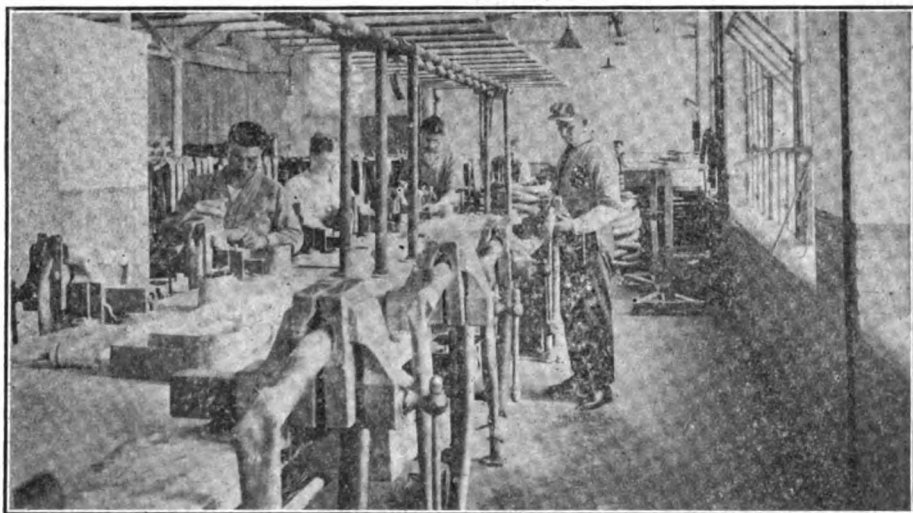
are made in another plant, equally well designed and equipped for the work, are built on steel base bands that are grooved and cut under, a layer of hard rubber being vulcanized into the grooving. The hard rubber is placed in the bands in sections and consolidated by vulcanizing. On this base the rubber is wound circumferentially in long strips that are cemented together. The sides are trimmed to the required form, that of the American type decreasing in width from the inner edges of the band flanges to the tread which is flattened. The European type is very nearly semi-circular in form, having greater width and depth than the American.

After the tire has been made by winding the rubber on and it has been trimmed to form, it is vulcanized in a sectional mould, the halves of which are retained under hydraulic pressure of 1500 tons, the rubber compound expanding under the heat of live steam at 290 degrees and becoming practically one piece. The rubber must be perfectly unified to obtain the desired resiliency

The accompanying illustrations are of the operations of the plant of the Hood Tire Co., and they show the manufacture of pneumatic tires progressively. From these the reader may obtain a very good knowledge of the work in every stage, and a clear idea of the equipment necessary for producing high grade shoes.

FACTS ON LUBRICATION OF THE RACING CAR.

Perhaps there is no type of automobile that receives more hard usage than the racing machine. For this reason one of these cars must be given the most careful attention and the best lubrication possible. It is a significant fact that nearly every well known racing driver of prominence prefers Dixon's graphite automobile lubricants. Many of them are firm in the belief that these lubricants have played a very important part in their winning. A driver entering a race with perfect confidence in the machine lubricant always has the feeling that his machine will be in the best of form.



Tube Splicing: The Final Process in Tube Making Is Fitting the Valves to the Bases and Lapping and Splicing the Ends by Acid Curing, Which Is Practically Instantaneous.

and endurance, and the degree of compression that insures this unity may be best judged from the extremely high pressure. The tire differs in this respect very much from those that are made of a section formed to shape under comparatively light pressure and lapped and cemented, and the grain of the compound, upon which depends very largely its strength, is an entirely different character than that formed in any other manner. The only difference in Hood tires is in the cross section, that of the European type being larger and having more rubber in it, having greater endurance. The Hood solid tires were first sold on a rental basis, the truck owner paying a definite price for each mile driven. This system has been discontinued and the sales are made direct, as are other makes of tires, and a very significant fact from the viewpoint of the company is that the mileage obtained very much exceeded the guarantee in nearly every instance of use.

GREENFIELD TAP AND DIE ADMINISTRATION BUILDING.

The Greenfield Tap and Die Corporation, Greenfield, Mass., will open its new administration building for public inspection on Tuesday, March 5, and have issued invitations to the trade to visit the new structure, which has been erected with the object of increasing the efficiency of the administrative organization of the company.

With the new offices opened the officials will be able to coordinate the administrative work of the rather widely scattered plants. Heretofore each plant has maintained its own offices and shipping room, but hereafter the office work incident to the manufacturing operations in the various plants will be concentrated in the new building. Some idea of the extensive manufacturing operations in the Greenfield plants is revealed by the fact that approximately 125 persons are employed in the office end alone.

Few Chassis or Mechanical Changes

New Elcar Engine

The Elkhart Carriage and Motor Car Co., Elkhart, Ind., is offering for 1918 two chassis, each fitted with any one of three body designs. The Elcar sedan is of solid and permanent construction. The perpendicular pieces in the top are not removable and the glass panels lower into the doors and sides of the body. The doors are staggered, the left hand being forward for the convenience of the driver, while the right hand side is in the centre. The forward seats are individual, with a passage way between. Model E, the four-passenger roadster, has four doors, so that passengers may enter or leave the rear compartment without disturbing the occupants of the forward compartment.

The four-cylinder chassis is equipped with a $3\frac{1}{2} \times 5$ engine, developing 37.5 brake horsepower at 2100 revolutions per minute. This is the same motor that was used last year, but it has been redesigned, having a heavier crankshaft of two-inch diameter, larger valves and larger gas passages. In either chassis standard construction has been followed and there is nothing that might be looked upon as a novelty. The clutch in the four-cylinder chassis is of the dry multiple disc type, Raybestos against steel. The frame is more sturdy than heretofore and the side members are $4\frac{1}{2}$ inches deep, with a two-inch flange. The springs are semi-elliptic, front and rear. The gas tank is rectangular, and is suspended in the rear of chassis, and the feed to carburetor is by the Stewart vacuum system. Timken roller bearings are employed in both front and rear wheels. The rear axle is full floating, with spiral bevel driving gears. The drive is the two universal joint type, with tubular propeller shaft, drive and torque being taken by the springs. The wheelbase is 116 inches.

The six-cylinder chassis is of the same general construction, except that the motor is the Continental $3\frac{1}{4} \times 4\frac{1}{2}$ engine, developing 40 brake horsepower at 2100 revolutions per minute. In connection with this motor a single dry plate clutch is used, instead of the multiple disc.

Hudson Features

While no radical changes have been made in the 1918 line of Hudson cars, there are several new attractive body types totally different from any ever built by the Hudson Motor Car Co. There are changes, too, and added refinements in every one of the models.

There are 10 models in the Hudson line—two open and eight of the enclosed type. Of the latter the runabout landau, the touring limousine and the full folding landau are new additions to the line. Of these three, the touring-limousine perhaps stands out as the most unique body type. It is both a limousine and a



C. E. Fay, Maxwell Distributor in Eastern Massachusetts and Rhode Island.

sedan, possessing the advantages and convenience of either type. It has a seating capacity for four. When the glass partition between the front and rear compartments is lowered it possesses all the intimacy of a family car. When this is raised, however, it becomes a chauffeur driven car, a motor dictograph furnishing means of communication with the driver. The runabout landau is a two-passenger car that can be instantly transformed from a snug cabriolet into an open roadster. The full folding landau is strictly a town car type.

The new Hudson limousine, the town car and the landaulets also have a squareness to the coach lines that adds greatly to their appearance, and the rear fenders are longer. The interiors are furnished in quiet colors. This year the open bodies—the seven-passenger phaetons—have changed slightly. The body lines have been lowered and there are a number of other marked refinements in these Hudson models.

The Haynes Engine

The Haynes "Light Six" engine, introduced more than three years ago, is continued almost without change in the Haynes 1918 models. It is an L head type engine with $3\frac{1}{2}$ -inch bore and five-inch stroke and on a brake test develops 50 horsepower. The intake manifold is cast integral with the cylinder block and is entirely surrounded by a water jacket, tending to keep the manifold at a constant temperature and practically eliminating condensation. The air is heated before it enters the carburetor by a box around the exhaust manifold, providing for better vaporization of the heavier fuels.

Lubrication is of the circulation-splash system in which oil is pumped directly to the main bearing pockets, the troughs into which the connecting rods dip and the timing gear case. The circulation of

the oil is by means of a piston pump operated off the camshaft drive, eliminating noise. The transmission is mounted with the motor as a unit and is unchanged with the exception of the gear ratio, and case alteration for mounting the starter. The ratio on low gear has been changed to give a greater tractive effect, called for in different localities.

The clutch is the standard 10-inch Borg & Beck, which is of the single driven dry plate type, with a non-gran bushing carried in the flywheel to line up the transmission stem gear. The starting motor has been moved from the front of the motor case to the transmission to enable the use of a Bendix drive to a ring gear on the flywheel. This does away with the over-running clutch and chain. Through this many small parts are eliminated. The spring, which is a part of the Bendix drive, absorbs the sudden stresses in passing over the compression stroke and in the engagement for starting, prolonging the life of the starting motor.

Maibohm New Six

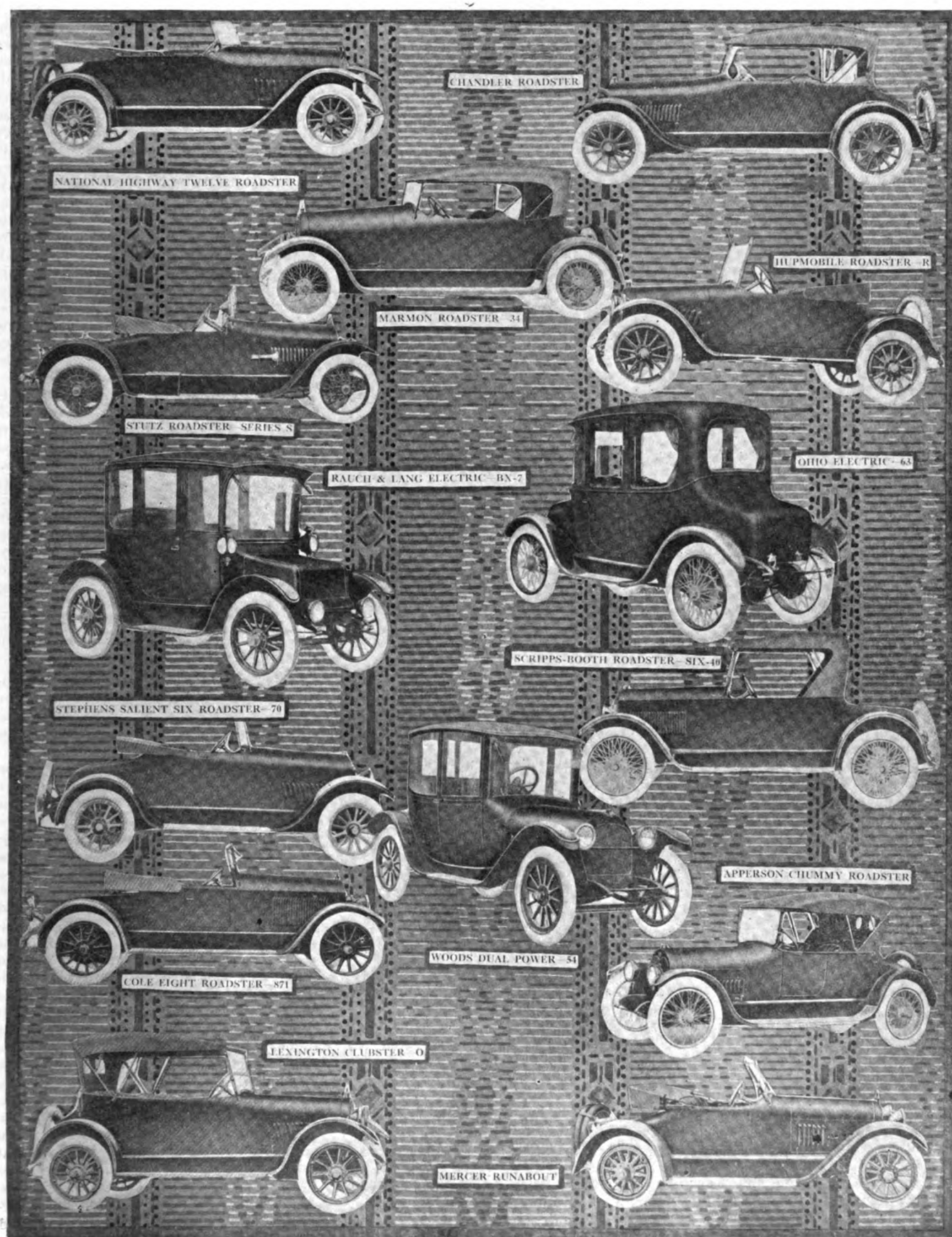
A new six-cylinder model with a 115-inch wheelbase features the 1913 line of the Maibohm Motors Co., Racine, Wis., which is now in the third year of production. There are three open models on the six chassis selling at \$1050 and a coupe and sedan priced at \$1650. The four-cylinder model with a wheelbase of 105 inches is continued with roadster and coupe bodies. The former model sells at \$830 and for \$920 with a detachable winter top and the coupe, which has a permanent top, sells for \$1095.

A Falls overhead valve engine, $3\frac{1}{2} \times 4\frac{1}{2}$, is used in the new Maibohm Six and has a detachable head. The crankshaft, which has a diameter of $2\frac{1}{4}$ inches, is supported on three large bearings. It develops its maximum horsepower at 2290 revolutions per minute, at which speed a brake test shows about 40 horsepower. A Stromberg carburetor is used, fed by a Stewart vacuum system from a 14-gallon tank located in the rear. Thermo-syphon system of cooling is used with Perfex radiator. Atwater Kent ignition system with manual control is used and the starting and lighting system is a Wagner two-unit, six-volt system with Willard storage battery.

A Borg & Beck clutch and Mechanics three-speed gearset are in unit with the engine. The drive is through a tubular propeller shaft with two $4\frac{1}{2}$ -inch universals. Semi-elliptic underslung springs take both the torque and the drive from the full floating rear axle, which is fitted with Warner gears and Bower roller bearings.

A Maxim silencer is used in place of the conventional muffler. The wheels are of wood, fitted with $32 \times 3\frac{1}{2}$ inch Good-year tires.

For the Business and Professional Man



Comforts in New Roadsters and Runabouts

New Kline Models

The 1918 Kline models, known as "Third Series, Model 6-38," include a four-passenger sport-tour model, at \$1495. This model is built on the Kline standard chassis and has a long low side body of touring-racing appearance.

The other third series models are a five-passenger touring car, four-passenger Shamrock roadster commonly called Cloverleaf, two and three-passenger runabout and five-passenger sedan with auxiliary seats. These will be mounted on the standard 120-inch wheelbase chassis which is being used for the third year with improvements.

The new features are higher radiator, giving the hood less slope; straight front radiator instead of V; wider body at the cowl, front and rear seats; three inches longer floor line in the tonneau; straight piped French style upholstery of real leather (no buttons); additional equipment to the regular is Moto-Meter and spot light; lower hung chassis without sacrificing road clearance of 10½ inches; longer and flatter rear springs, giving smooth riding; anti-squeak used throughout to prevent noises; the adoption of K in the rear curtain light in the top to designate to the trade mark, and an improved tire carrier bolted direct to the frame side rails, which are extended back of the body.

Nine New Velies

The new Velie Biltwell Six series consists of nine entirely new models, including roadster, touring cars, enclosed cars and a very unusual sport model. Body lines on all cars follow the straight line idea. The high radiator and hood continue the effect even to the nose of the radiator itself. The seats are much deeper. One rests well down in the car on soft woven curled hair upholstery, with real leather covering in French plaited style. The doors are wide and there is more leg room in both compartments. The top is of waterproof material, having curtains opening with the doors. Nickel plated top moulding accentuated the lines. The curtains are stored without folding in an overhead envelope. All closed models are regularly equipped with exhaust heaters. The extra seats in the seven-passenger disappear completely. The sport model has outside exhaust pipes extending through the hood, with short footboards and other novel features.

Mechanically, there is little change in either Velie Six chassis. There is additional cooling surface, due to the higher radiators. The Velie Continental motors handle low grade fuel and show even more power than heretofore. The Timken axles have improved elements of safety and strength. Many minor details of convenience and control show a careful attention to needs of the motorist.



A. H. Sowers, New England Distributor of Jackson Car.

New Liberty Roadster

The standard chassis perfected by the Liberty Motor Car Co. of Detroit is being continued in the production of all Liberty 1918 models with the exception of a very few minor changes. Chief of the two or three slight alterations is the use of an aluminum crank case for the motor, resulting in reduced weight and consequent increased power in proportion to the load.

Other features which will be continued in the new models consist of countershaft of extra heavy design, mounted on three bearings and driven by a fabroid gear, extra long connecting rods, reducing wear on the cylinder walls and wrist pin bearings. Another feature is the hot spot in the manifold, a device for making more effective the use of low grade fuel, which has recently been adopted by a number of manufacturers. This was incorporated in last year's Liberty cars and will be continued in this year's models.

Five well known body models, consisting of four-passenger roadster, five-passenger touring, brougham, landaulet and sedan will continue to be represented in the Liberty line. In external appearance they are much the same. Some changes in detail have been made to provide for the greater comfort and convenience of the owner, such as larger lamps, lower license bracket, metal binding instead of cloth on the top bows, haircloth carpets and straight pleated type upholstery.

This year will also see the introduction of the new two-passenger roadster. In common with other models it is mounted on the standard Liberty chassis. The body lines are trim and modish, of distinctive Liberty design. The rear deck slopes down to a tapered, rounded point.

A Harroun Roadster

A new body type is presented in the Harroun Military Roadster. The purpose back of this car's design was the construction of a vehicle to supplant larger, heavier cars in the use of owners who want efficiency combined with looks and quality. The finish is blue-black gun metal, satin surface. Upholstery is of No. 1 grade, hand tufted, low, tilted seats. A khaki top with snugly fitting curtains is standard equipment. The control levers are well out of the way of entrance or exit, but handily in reach. The usual door pockets are but a small part of the carrying space provided in the car, which has two large parcel compartments in the seat back and a locker on the rear deck large enough to take care of two suit cases and other baggage. The extra tire or wheel is carried at the rear.

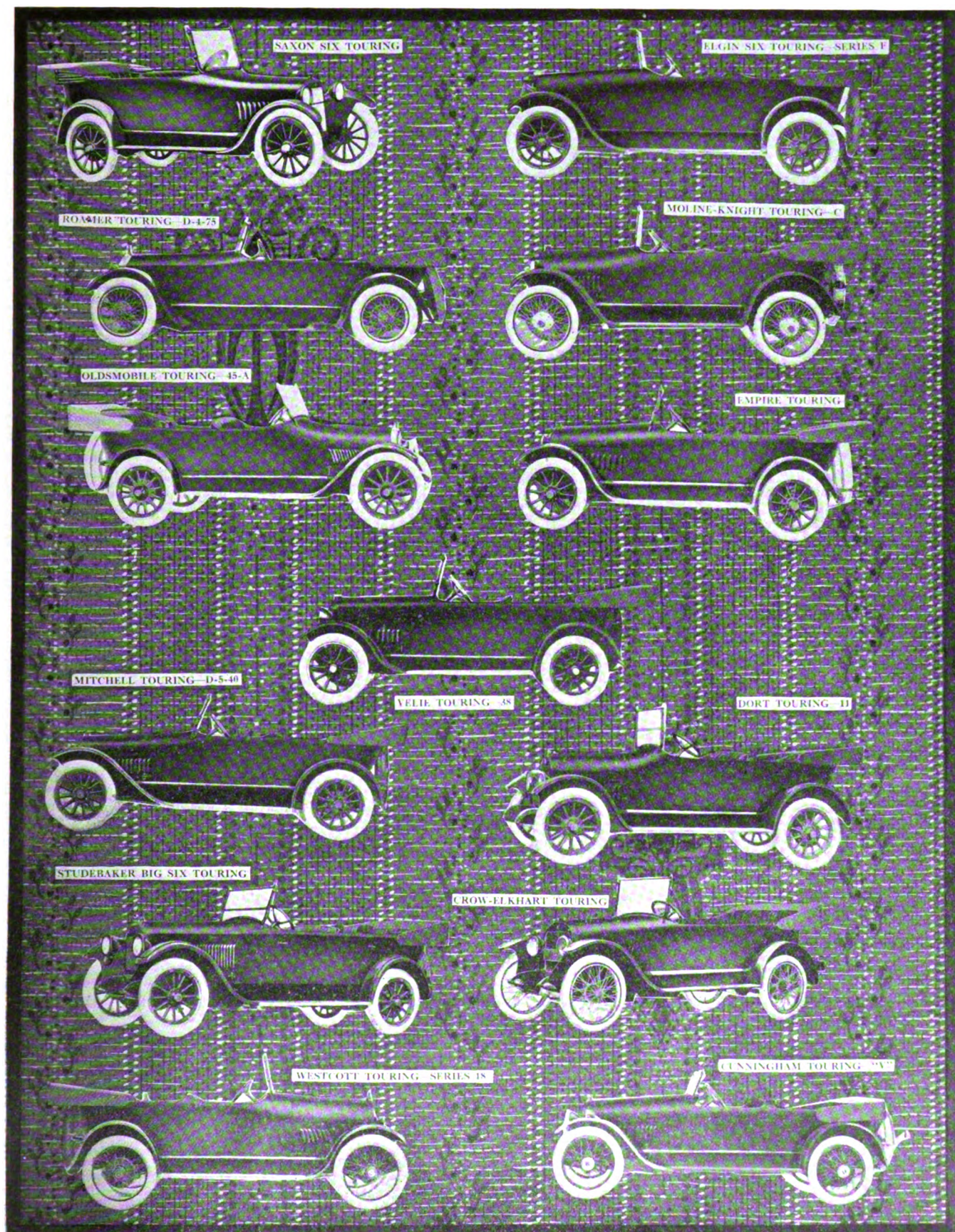
Moderate wheel base permits unusually short turning radius, which coupled with Ray Harroun's original application of the cantilever rear spring, combines ease of handling with an unusual degree of passenger comfort. The radiating oil cooler, spring spoke steering wheel, racing type motor, freeze resisting radiator and other exclusive Harroun features are all incorporated in the Military Roadster. Gasoline supply is in a large tank, hung at the rear and feeding through a vacuum system.

New Cole Body

The Cole Motor Car Co. of Indianapolis exhibits three new Cole Eight models, each equipped with the aerotype body, a departure in automobile designing.

These models are the seven-passenger Tourster, the four-passenger Sportster and a two-passenger Roadster, all with the aerotype body, which is distinctive in design and strikingly attractive. The exclusive line effect is produced by a high cowl, low beveled panels, massive fenders and sharp, keen outlines. A sharp line extends from the beveled front of the large radiator along the entire length of the car, forming a line of relief at the side hanging point of the hood and the base of the bevel which finishes off the side panels. There is only a small curvature in the back panel of the cars and it converges with the sides almost at right angles. The idea in the design is fashioned after the new airplane body types and in addition to producing an elegant appearance, results in a great reduction of wind resistance. This latter fact has been proved out by the company, which tested out the new cars for the increased speed that was expected and realized their expectations. A speed of between 60 and 65 miles an hour was maintained on the road and on the track a better average was obtained without exerting the motor.

Light and High Powered Touring Models



Innovations and Refinements Revealed

Auburn Six Model

The Auburn Six, manufactured by the Auburn Automobile Co., Auburn, Ind., is made in two chassis models again this year, with a complete line of body types. On the 6-44 chassis, which has a wheelbase of 131 inches and is equipped with a Continental $3\frac{1}{2} \times 5\frac{1}{4}$, six-cylinder engine, there are three seven-passenger types, a touring model, convertible sedan and sedan Springfield type. The touring model sells at \$1345 and at \$1595 with convertible sedan top. High grade waterproof material is used on the deck of the top. The interior of the top and sides is trimmed in heavy cloth. The car can be changed into the touring type by removing the glass in the windows and doors.

There are five body types on the 6-39 chassis, which has a Teetor-Hartley, $3\frac{1}{4} \times 4\frac{1}{2}$ six-cylinder motor, developing 43 brake horsepower at 2150 revolutions per minute. A touring model, convertible sedan, chummy roadster, chummy coupe and sport type are furnished on this chassis. The bodies are distinguished among the medium priced class of cars for their exceptional design and finish, affording a maximum of comfort, convenience and riding qualities. Many little refinements go to make up this elegance, including invisible hinges, inside flush latch handles, luxurious upholstery, open dust shedding type of cushions, deep springs and curled hair stuffing. The five-passenger touring car on the 120-inch wheelbase chassis sells for \$1345 and the chummy roadster at \$1345. The touring model sells for \$1685 and at \$1985 with the convertible sedan top.

Engine equipment on both models is practically the same, Remy electrical equipment being used for ignition, starting and lighting, and a Rayfield carburetor with vacuum feed. Both engines have pump circulation and force feed and splash lubrication. A Borg & Beck clutch and Grant-Lees gearset, in unit with the engine, are used on both models and the drive is taken by torque arms. Model 6-39 has a $\frac{1}{4}$ -floating axle with semi-elliptic rear springs, while the model 6-44 has a floating axle with cantilever rear springs. Tire equipment on the 6-39 model is 34x4 and 35x4 $\frac{1}{2}$ on model 6-44.

Dort Improvements

The Dort Motor Car Co. of Flint, Mich., is showing the new model 11, the latest development of Dort engineering and body design.

No radical changes are found in the Dort car, although several refinements in design and minor mechanical improvements are noted, each aimed to beautify the lines of the car and simplify its operation. The outstanding feature of the Dort chassis is its unusual accessibility. Simplicity and convenience seem to have



F. A. Hinchcliffe, Kissel and Jordan Distributor.

been the goal of its engineers and they have succeeded admirably in their endeavors.

The body design has been materially improved by changes in the contour of hood and fenders and there is a cellular type radiator in place of the tube and fin tube formerly in use. Westinghouse starting and lighting, Carter carburetor, Jacox steering gear, cantilever springs and Connecticut ignition are among the ear marks of the Dort that give it a high value rating in its class.

Kissel Top Feature

The Kissel Motor Car Co., Hartford, Wis., is maintaining its reputation as a leader in body development and design, announcing many innovations in the new four-passenger Kissel sedan and the five-passenger staggered door touring sedan.

Both models are on the Kissel Hundred Point Six chassis and are equipped with the latest Kissel all-year top, which is not entirely removable, but in which all side windows can be raised or lowered at will, an exclusive Kissel feature, and one which makes the cars serviceable in stormy weather or fair, as by lowering the windows a semi-open car is obtained and an open touring car by removing the all-year top.

An added feature is a new distinctive summer top in pantasote of a semi-victorian style, with one French plate glass "porthole" on either side and two in the rear.

Kissel all-year tops built into the frame work of the bodies and at the same time so that the two halves dovetail and allow no visible fastenings or attachments to show. Selected white ash and elm are used in the frame and doors of the top, and are covered with silver finish sheet steel. The roof is made up of three-ply paneled white wood under heavy laminated duck canvas. The

French plate glass windows are so set into the top that leaks, draughts or rattles are impossible.

There are 10 points where the body and top are joined with bolts, in dowel plates and sockets. A layer of felt and non-squeak material where the body joins the top eliminates noise and makes the joint weather proof. Spring plungers automatically connect up the wiring system as the halves are attached.

Twenty-two body finishing operations, eight more than usual, on both of the new models, give them an exceptionally luxurious appearance, which is enhanced by the graceful hang of the tonneau made possible by an arch in the bow of the frame.

1918 Crow-Elkhart

In the 1918 Crow-Elkhart line, known as "Series K," announced by the Crow-Elkhart Motor Co., Elkhart, Ind., there are six models, as follows: Five-passenger touring car, five-passenger de luxe touring car, four-passenger de luxe clover leaf roadster, convertible coupe and convertible sedan. Wire wheels on any of the models are \$100 extra.

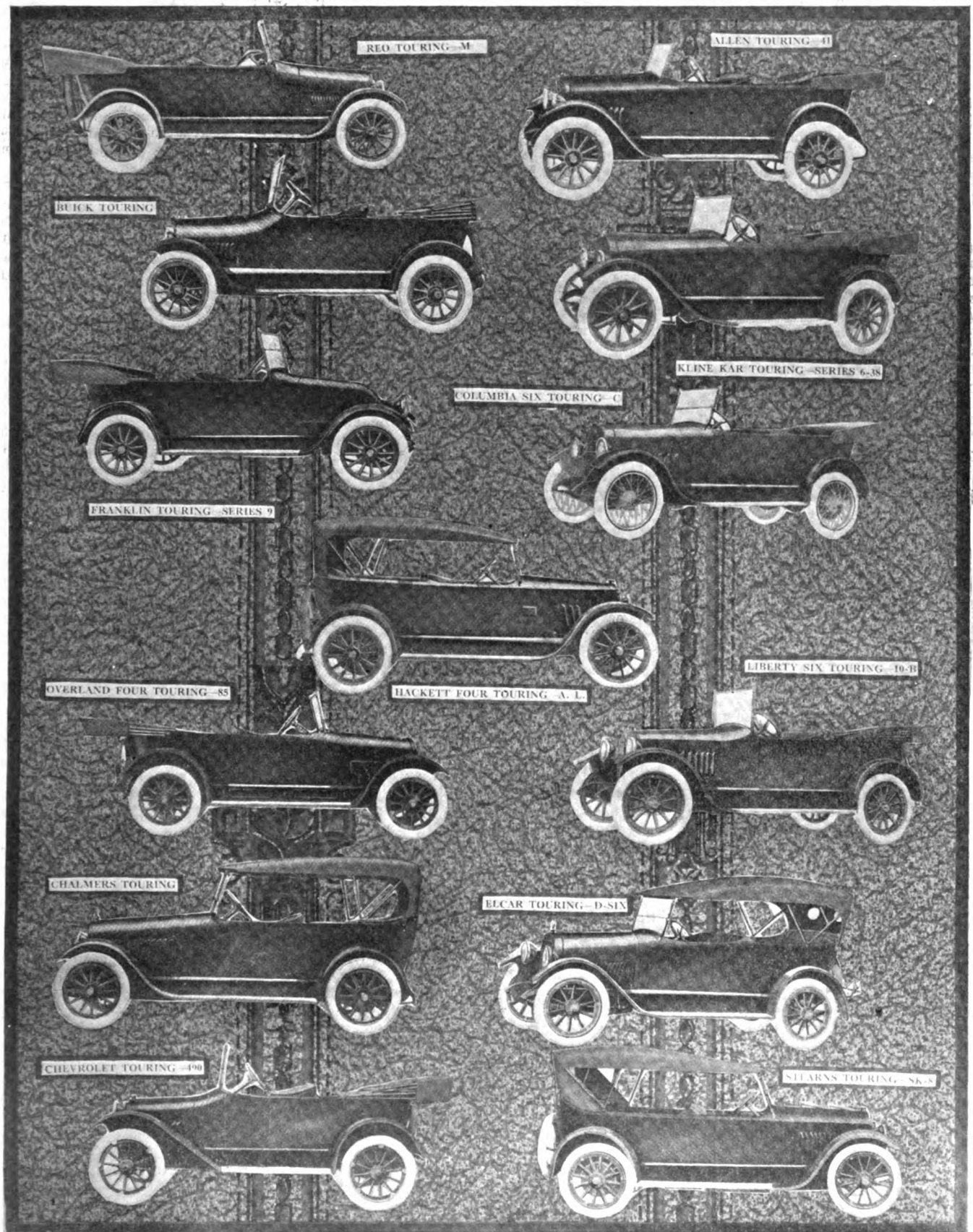
Mechanically the cars are improved and refined over cars of other years, though the chassis design is not radically altered. Chassis improvements enumerated include the Borg & Beck clutch, which has a self-lubricating bearing; Stewart vacuum feed system, 12-gallon tank, which is at the rear of the car instead of under the cowl, as in other years. Timken bearings are used in all wheels and the drive is by the Hotchkiss system, through the springs. The speedometer is driven from the transmission.

A feature of the car is the thermoid flexible universal joint, which does away with the need of lubrication for the universals, or the need or a torque arm. One of these flexible universal joints is in front of the car, back of the transmission, and the other is in the rear of the car in front of the rear axle. The joint consists of three flat pieces of rubber and fabric bolted to one side of the drive shaft and on the other side of the shaft, going into the rear axle, with the result that bumps are never transmitted to the car, and the effect is the same as driving through a rubber drive shaft.

The regular five-passenger touring car has the latest torpedo body design, has the slanting oval-based windshield, high grade long grain upholstery, soft, deep pleated cushions 21 inches in depth, comfortable double back, the top of the front seat back being metaled, giving the double cowl effect; removable gas tank from the cowl provides 46 inches leg room in front and a 48-inch seat is used with additional tonneau space.

In the four-passenger clover leaf roadster the slanted windshield is also used, khaki top, nicked radiator and greater accessibility to all control instruments.

The Slanting Windshield Comes to Stay

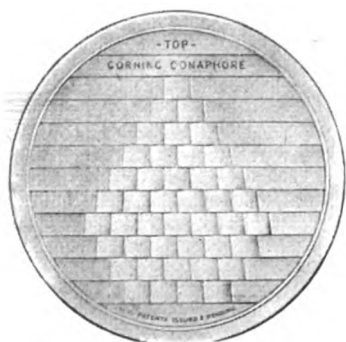


Many Devices for Solving Headlight Problem

Special Lenses Eliminate Glaring Beams of Light So Dangerous To Night Driving and Comply With the Requirements of the Law

AS TIME passes the traffic upon the roads gains volume and the number of accidents caused by glaring headlights increase. There was a time when the autoist who continually suffered from glaring headlights flashed in his eyes could change his lights for a larger size and thereby get so much light for himself that he could see the road. Such a procedure does not tend toward safety, by any means, for under those conditions the lights grew brighter and the risk greater, until at last it became hazardous to drive a machine on the roads at night.

The voice of the people at last made itself heard and the various state legislatures and automobile boards began to enact laws governing the size, strength and position of headlights. Some of the laws might seem to be unjust and unreasonable, but in general they offered the only solution of the headlight problem, and if they are restrictive, only the autoists themselves who abused their privileges are to blame.



The Corning Conaphore.

Though the laws are not national, the general conditions to be observed in the various states are much the same. To conform to the law of 42 inches from the ground, as established in New York and Massachusetts, for a distance of not less than 75 feet ahead of the machine, covers the law as far as direct glare is concerned in all of the states.

To provide lights which illuminate the road on each side for 10 feet, at an equal distance from the car, is the second requirement, which meets conditions in all states.

With these two requirements in mind the motorist should look to his light equipment, for even though he may be following the law in his own state, there may come a time when he will journey to a neighboring state, and in doing so place himself under the laws of that state.

Though many of the automobile manufacturers furnish headlight equipment which conforms with the law, not all of the lights are so equipped, and the operator lays himself open to prosecution un-



The Shaler Roadlighter.

less he furnishes the proper lenses or devices for his car. The same is true of the older cars, equipped before the enacting of headlight laws.

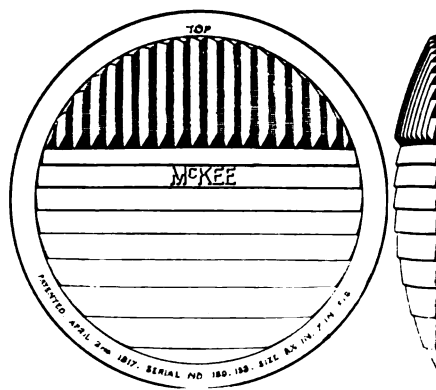
Practically every well known device now on the market is designed to meet the headlight laws of the various states, and the buyer cannot make a mistake, provided he purchases a device which is well known.

Such devices are divided into a number of classes. The first and more extensively used are headlight lenses. By prismatic effects, ribs, stars, beveled edges and other methods the lens breaks up the direct rays which illumine above the 42-inch limit, and refract them to a restricted area.

Devices which are attached to the bulbs of the electric lamps are a second type, which are preferred by many drivers. These devices may either reflect or refract the light as the case may be, and give satisfactory results.

In a class by themselves are visors or screens which absorb or reflect the light after it has passed through the lens. This type of reflector or light regulating device is stock equipment on a few cars.

Still another method of light regulation is had in the tipping of the lights upon the approach of another car. By this means all of the light rays are



The McKee Lens.

thrown upon the road ahead, giving sufficient driving light, but no light in the face of the other driver.

Space will not permit us to mention all of the lighting devices on the market, nor can we give a detailed description of a few, only a general description of each type will be given.

The Conaphore, sold by Conaphore Sales Division, Edward A. Cassidy Co., Managers, Madison avenue and 40th street, New York City, is a typical lens of the first class. This lens is obtainable in sizes ranging from five to 11½ inches in diameter, and in either plain or Noviol glass.

Across the front of this lens are a series of horizontal prisms which refract the glaring beams and direct rays of light downward. A second series of squares, arranged in semi-triangular formation and extending over the centre of the lens, are designed to reflect light toward the sides of the road. All of these prismatic panes are cast into the glass and being on the inside do not



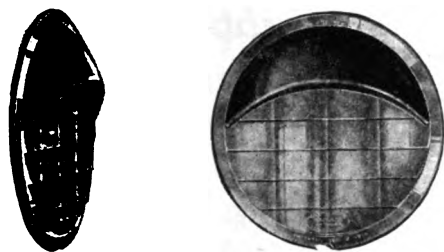
Holophane Headlight Lens.

collect the road dirt and dust. The front of the lens is perfectly smooth.

The Noviol glass, being of yellowish tinge, absorbs the glaring rays of blue and violet and permits only the non-glaring rays to pass. The prismatic arrangement is the same as that of the clear lens.

Protection of the user against the blinding glare of headlights he meets is one of the leading advantages of the Shaler road lighter over headlights with clear glass or other fronts. In addition it enables the user to comply with laws, where they exist, by eliminating his own glare; it illuminates the full width of the road; it throws a more intense light farther ahead than clear glass; it shows the road through fog, rain or dust, and it lights up the road signs as they are passed.

The scientific design of the road lighter accomplishes these functions in a novel manner. Instead of considering the light from the lamp as a single beam which must be wholly diffused to eliminate glare, with the inevitable shortening of range, or which must be limited vertically to the legal height, this de-



Side and Front View of Macbeth Lens.

vice divides the light into three distinct beams. These are distributed on the road so as to produce the ideal lighting condition—a long, narrow, concentrated distance beam and two other concentrated beams that give the effect of a pair of regular headlights plus two spot-lights set to illuminate the foreground and edges of the road.

The result is that while the distance light is ample for driving at daylight speed, the edges of the road are lighted so intensely that even when meeting headlights that glare one can always see exactly where he is going as he approaches and turns out to pass.

No glare is produced to blind the other fellow and all laws are complied with because all of the light is kept below the level of the lamps.

The accomplishment of these two things put the road lighter among the greatest of safety devices, for unless one can see the road clearly at all times, especially when meeting other cars, all other safeguards lose their power to protect him. It is safe to meet as well as safe to drive behind.

The trade mark of C. A. Shaler Co., Waupun, Wis., prominent manufacturers of accessories for many years, is carried by this new accessory, which meets a ready demand by eliminating the greatest danger of night driving.

The McKee Glass Co. of Jeannette, Pa., put out a product termed the McKee lens, which is constructed on the principle of horizontal and vertical prisms, giving a direct beam of light on the road ahead, limited to 42 inches in height, and with sufficient light to the side to illuminate the curb and passing cars.

An exclusive feature of the design of the McKee lens is that it is concave-convex. By an arrangement of vertical prisms in a sector across the top of the

lens the light which is wasted in a plain glass plate, by being thrown skyward, is turned back on to the reflector and thence through the horizontal prisms. The vertical prisms, at the side of the lens, diffuse the rays of light to the sides.

A lens of unique design is had in the Holophane, made by the Holophane Glass Co., Inc., 340 Madison avenue, New York. Upon the back of this lens is fitted an opaque fin, just above the light bulb. The direct rays are prevented from passing from the bulb to the lens. Above the fin the lens is cut into horizontal prisms, which deflect the reflected light from the parabolic reflector downward, and thus reduce the direct glare. Slightly below the centre are a series of curved lines which break up the lens into a number of curved prisms. These curves are so arranged that all direct, as well as as reflected light, is thrown directly ahead within certain limits, giving a long distance beam.

Between the horizontal prisms and fin and the curved portion the lens is broken by a series of diagonal lines, for the purpose of deflecting light to the sides. At the centre is a bull's eye re-



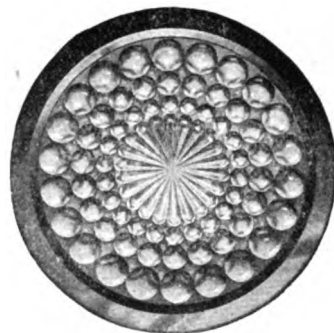
The Sun-Ray-Lens of the Prismolite Co.

fractor prism to control the direct central rays.

A headlight lens, known as the Macbeth lens, made by Macbeth-Evans Glass Co. of Pittsburgh, is distinctive in design. The front surface is divided into five horizontal prisms, each of which is inclined at an angle that was determined by experiment. This arrangement is said to direct the light below the horizontal, lighting the path of the car at the greatest distance possible, without having the glare of the lamps blind the driver of an approaching machine. A concave surface at the back of the lens results in the deflection of the rays to the sides. To eliminate any chance for rays to extend upward, the lens is fitted with a green visor, making the whole device ornamental, and, in a measure, protecting the lens from weather.

The Osgood Lens and Supply Co., 2007 Michigan avenue, Chicago, Ill., manufacture a horizontal prism lens. The prisms on this device are of varying widths, the smallest at the top. An arrangement of prisms at the centre cut off the direct central rays.

In the Sun-Ray-Lens, made by the Prismolite Co., Fourth and Gay streets, Columbus, O., the lens is divided into a



The Warner Lens.

great number of small square prisms, designed to throw approximately 90 per cent. of the light directly ahead of the car, in a line parallel with the road surface.

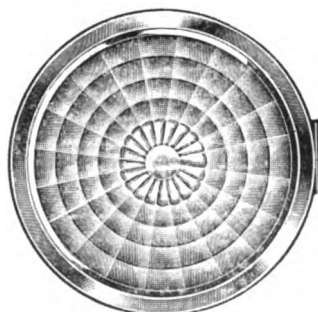
These square prisms are separated from each other by small triangles, through which the balance of the light given by the bulb is refracted to the sides of the machine, at an angle of about 168 degrees, affording light for determining the ditch lines. These lenses are smooth on the outside and offer no projections for the gathering of dust and dirt.

The Dillon Multi-Vision Lens, distributed by the National Distributing Co., 240 Oliver building, Pittsburgh, Pa., is a device made with an ingeniously arranged bull's eye placed in the centre, which not only is said to magnify the light, but concentrates and directs it upon the road ahead in parallel lines.

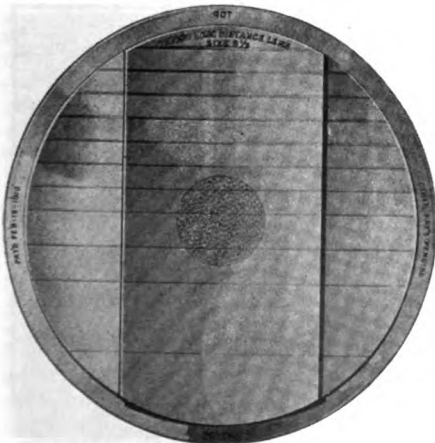
A feature of this device is its projecting face. Extending as it does, beyond the headlight rim, it refracts light to the sides almost at right angles to the machine.

The interior portions of the lens are mottled to diffuse the direct rays from the bulb, resulting in a clear, soft light, of sufficient strength to illumine the road for many feet ahead of the car, in a square path of light.

A popular lens and one that has been adopted as standard equipment by a number of large car manufacturers, is sold by the Warner Lens Co., 914 South Michigan avenue, Chicago, Ill. This lens is very attractive in appearance and being composed of a number of small bull's eye lenses, arranged about a common centre, has a great diffusing effect upon the direct rays of light. It is claimed that this device deflects all of the direct rays and prevents them from extending above the 42 inch limit. Such is the prismatic arrangement that the



The More-Lite Lens.



The Osgood Lens.



The Lennon Light Protector.

Light is deflected also to the sides of the road, though without glare.

The Saferlite Lens Company of 220 Fifth avenue, New York, manufacture a frosted glass which is divided into a great number of small squares, much the same as a piece of window screen, by projecting ribs of glass. The light given off through this lens is widely diffused and shadowless, covering an area of sufficient size to show an object on either side of a hundred foot road, on a line with the bumper.

Controllite Lens, made by the Super-Lighting Co., Inc., 1834 Broadway, New York, is another lens of the horizontal prism type, and the manufacturers claim the beams to be controlled to the legal standard. It is claimed that with this form of lens the greatest beam width is nearest to the car, and that a light has a range of more than 300 feet when fitted with 21 candlepower bulbs.

A lens of pleasing design is called the More Lite, and manufactured by L. E. Smith Glass Co. of Mount Pleasant, Pa. This lens is comprised of a number of triangular shaped prisms, radiating from a common centre and separated by diagonal lines. At the centre is cast a "daisy" petal glass effect, which adds to the attractiveness of the lens. With this lens, as with all the others spoken of, there is an absence of direct ray glare, the light given off, however, is sufficient for ordinary road illumination.

The second method of controlling headlight beams is in the application of devices to the bulbs or reflectors, which prevent the direct rays from extending upward. A typical representative of this type of device is called the Lennon Light Protector, distributed by J. H. Faw, Inc., 41 Warren street, New York. This device is made of one piece of metal, heavily plated and highly polished. It is designed to snap over the bulb and is held in place by the "Nib" of the bulb and two integral lips. It is made of spring brass, so that it may be applied to either oversize or undersize bulbs, without any danger of damaging the bulb.

With a device of this sort all of the light from the bulb is reflected and none of it is absorbed. The ordinary plain glass lenses may be used.

A transparent device for attachment to the bulb is made by the Crew Levick Co., 111 North Broad street, Philadelphia, Pa., and called the Crew Levick Fractor. It consists of a heavy, half cone of glass, which is cast with wedge shaped projections around the circumference. The glass is mounted upon a ring which fits over the bulb.

Due to the peculiar construction of the glass and its refractive power, the Fractor bends all of the direct rays of light

so that they extend straight ahead in a horizontal plane.

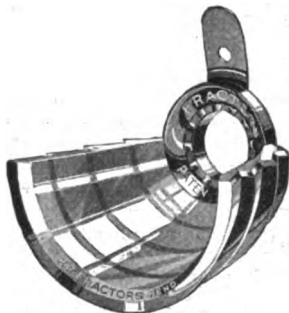
Tipping the headlights upon the approach of another machine is one method used to prevent dangerous glare and accidents due to improper lighting. A device called the Pennock Headlight Tilter, made by the Specialty Manufacturing Co. of Minerva, O., is such a mechanism. The headlights are mounted upon movable pins, which are actuated by a rod connecting the two brackets. Upon this rod is fastened a long arm and to the arm a rod leads to a foot pedal.

Pressure upon the foot pedal tips the lights to any angle within its range, thus removing the light rays from the air and diverting them to the road without cutting down on their brilliancy.

Many drivers prefer not to tip the whole light, but simply the reflector, and for this purpose the Adams-Bagnall Electric Co. of Cleveland, O., manufacture a product called the A-B Auto-Eyes.

With this device the reflectors, held on a strong support ring, are tilted in a positive way from horizontal pivots. The lamp bulbs move with the reflectors, remaining correctly focused in each position of the reflectors, giving at all times the maximum light and strength of beam.

The tipping mechanism is located in the left headlight, the right reflector be-



The Crew Levick Fractor.

ing tipped by a rod connecting with this light. A choice of two styles is offered, either mechanically or electrically operated.

The mechanically tipped light is fitted with a flexible metal tube, leading to and operated from the steering wheel by a hand lever. The electrically operated tipping device is located in the lamp and consists of a small specially designed motor, operated from the headlight circuit. The push button for making the motor circuit may be located at any convenient place in the car.

FEDERAL TRUCK PRODUCTION VALUED AT \$6,000,000.

The statement of the year's business of the Federal Motor Truck Co. shows value of total production for the year ending Dec. 31, 1917, as \$6,005,000, against \$4,261,000 for 1916. Assets include cash on hand of \$43,000, securities \$169,174, accounts receivable \$597,689, plant accounts \$537,983 and manufacturers' inventory \$1,642,701. Notes payable approximately \$507,500 and accounts payable \$420,000. Total production was 2918 trucks.

U. S. Rubber Company Sales Were \$176,159,000

President Colt Says Every Indication
Points to Even Better Business
In Ensuing Year.

The United States Rubber Co. reports net sales of \$176,159,000, an increase of more than \$40,000,000 over the sales of the previous year. President Samuel P. Colt says in his annual report: "There is every indication of our company doing in the present year a business even greater than in the past, and while the uncertainties of trade are greater than in normal times, we look for satisfactory results.

"With the funding of the company's indebtedness, accomplished early in 1917, the United States Rubber Co. has taken over the plants of most of the subsidiaries, including those of the Rubber Goods Manufacturing Co., all of the minority stock of that company having been acquired. This has made practicable the consolidation of the mechanical goods division of the company, which recently has been accomplished, and from which are anticipated very beneficial results."

The financial report follows:

Net profits for year 1917	\$24,423,963.51
Deducting interest charges and Federal income and excess profit taxes	3,117,856.99
Total	\$21,306,106.52
Reduction of inventory values	\$1,000,000.00
Depreciation of plants and equipment	1,500,000.00
Total	2,500,000.00
Estimated Federal income and excess profits taxes, and business profits tax on Canadian properties	2,465,529.89
Total	\$15,340,576.63
Dividends paid on United States Rubber Company preferred stocks	4,961,370.00
Dividends paid to minority stockholders of subsidiary companies	20,692.50
Total	4,982,062.50
Leaving as the surplus for the year	\$10,358,514.13



Pennock Headlight Tilter.

Quarter-Century Mark in Apperson Production

Eighty Less Parts

In New Sixty

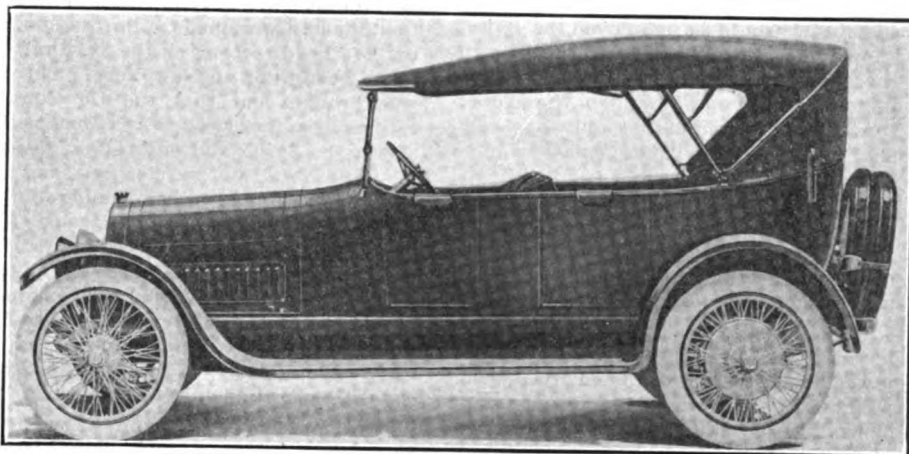
H. P. Engine

The announcement of the Silver Anniversary models by the Apperson Brothers Automobile Co., Kokomo, Ind., marking a quarter of a century in the production of motor cars, is of more than passing interest to motorists, as the history of this company not only teems with achievement in the development of the automobile, but has a touch of the romantic that appeals to the imagination.

Elmer Apperson and his brother Edgar built a practical motor car 25 years ago and the word built is used advisedly, for it was a hand-made affair and the hand of Elmer Apperson, who has been the president of the Apperson Brothers Automobile Co. since the first Apperson car was made, did most of the work on that car.

Mr. Edgar Apperson, who for 25 years has been associated with his brother, Mr. Elmer Apperson, in the manufacture of Apperson "Jack Rabbit" motor cars, has now been made general manager of the company, taking his brother's place. The two brothers have been associated in business since they were boys. Together they have evolved numerous improvements on the engine and on the passenger automobile. Pioneers in the building of cars they were also pioneers in the improvement of this economic necessity. In this connection it is interesting to note the coincidence of the announcement of the new Apperson "8" engine with the anniversary models.

When a boy in school Edgar Apperson pumped the bellows at the old forge of Elmer Apperson's Riverside Machine Shop in Kokomo, where the first Apperson was built. This work was done after school and naturally brought him in



The Seven-Passenger Model 1918 Apperson Equipped with the New Eight-Cylinder Engine. Side View Showing Wire Wheel Equipment.



Edgar Apperson, General Manager of the Apperson Brothers Auto Co., Kokomo, Ind.

touch with the birth of the automobile business. When the Apperson company was first organized Edgar Apperson by that time had developed an ability which

made him a worthy superintendent of the factory. It was but a logical act when Elmer Apperson wished to retire from the active management of the company that Edgar Apperson should step into his place.

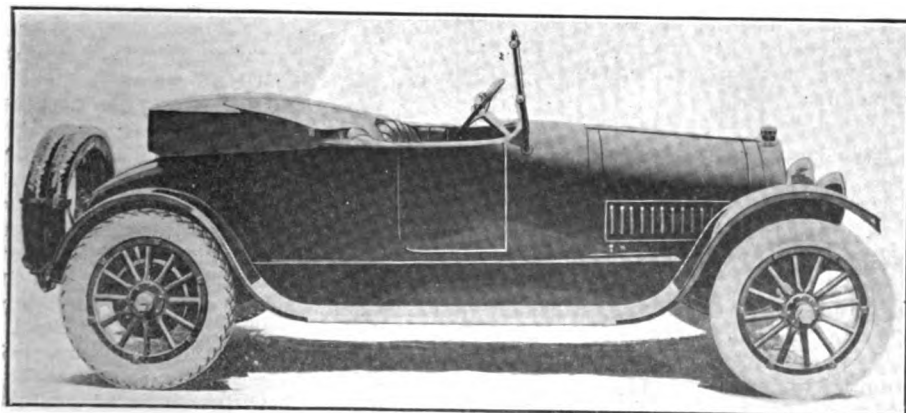
A number of years ago he entered the racing field and when he followed this line he was the winner of many first prizes and always in the showing. Back in 1898 he won the first speed contest given in America at the Charles River Park track in Boston. He drove the first car in contest to run 100 miles without a stop. He drove the first long overland run from Kokomo to New York City, a distance of 900 miles, back in 1898. Edgar and Elmer Apperson were first and second in the first big contest given by the Automobile Club of America in their overland run from New York to Buffalo in 1901. These are but a few of his accomplishments in the speed line. Since 1901 he has been unable to devote much time to this end of the business owing to the heavier duties in the manufacture of Apperson cars.

In track and road races, endurance runs and other severe trials of the Apperson early models invaluable experience and data was gained that enabled the Appersons to proceed into new fields of engine development with the assurance that they were adopting mechanical improvements that were true in principle and in practice.

This eight-cylinder engine of 60 horsepower is the first of its kind with a single camshaft and but two cam gears, without the many placed trigger board. It constitutes the power plant in the model "8-18" chassis of the new Apperson line, which has a wheelbase of 130 inches.

The story of this new engine development and construction, which eliminated over 80 working parts, is simple, but reveals the Apperson persistency in making improvements that are practical.

One of the most perplexing problems confronting engineers when the eight-



Apperson 1918 Chummy Roadster. Side View, Showing Graceful Lines and Cover for Rear Seat When Not in Use.

cylinder engine was first developed, was that of controlling the valve mechanisms. The Appersons worked on the idea that the ideal system would be that in which the minimum number of cams and camshafts would be employed, as it is a known fact that the less working parts there are in an engine the more satisfactory is its operation, so the Apperson engineers found that only one camshaft was necessary and but two gears were needed to operate it. With the single camshaft a series of rocker arms, arranged in a removable rack or case was used to carry the action from the camshaft to the valve push rods. It was termed a "trigger board."

While realizing that the "trigger board" was an improvement over previous mechanisms designed to accomplish that end, it had the disadvantage of having too many working parts and a new construction was designed which allowed the use of only two driving gears and one camshaft, and eliminated the "trigger board." The camshaft was redesigned with one cam for each push rod. No other change was necessary with the exception of a change in the angle of the valves and push rods. These were arranged so that the centre of the camshaft was in direct line with the centre line of the valves and push rods. The valve action is more positive with this new arrangement—the action being carried direct from the cam to the valve through the push rod.

Beautiful body lines have always characterized the Apperson models, but at no time has the company gone into extremes in body design, keeping uppermost the desire to provide the maximum of riding comfort for the passengers. The roomy seven-passenger and the original type four-passenger chummy roadster bodies are mounted on both six cylinder and eight cylinder chassis. The touring sedan body is mounted on the eight-cylinder chassis only. Both chassis are equipped with the Apperson make of engine, transmission and rear axle. In fact, 90 per cent. of the units that make up the car are manufactured by the Apperson company in their two well equipped plants. The six-cylinder engine is rated at 48 horsepower and is interchangeable in the Apperson frames with the eight-cylinder power plant.

The chassis of the model "8-18" is equipped with Apperson type demountable rear axle and I section drop forge front axle. Three-quarter elliptic springs are used in the rear and semi-elliptic in front. Shock absorbers in front increase the riding qualities of the cars. A carburetor of a well known make is used and fuel is taken from a tank in the rear with the assistance of the vacuum feed system. Double bulbed headlights offer the dimming device without the addition of any special lens. The clutch, a three-plate dry disc type, is also of Apperson design and make and requires no lubrication.

The electrical equipment, of the double unit type, is specially constructed for the Apperson car, and the starting motor and generator are entirely separate.

General Motors to Buy Chevrolet

THE most stirring and interesting announcement of the year in the motor industry was made following a meeting of the directors of the General Motors Corporation in New York. The fact was brought out that the Du Pont interests, together with W. C. Durant, had acquired a large and controlling interest in the General Motors company and that the directors had recommended an increase in the total capitalization from \$102,000,000 to \$200,000,000 preparatory to taking over the Chevrolet Motor company, which will establish the company as the largest in the world engaged in making motor cars in point of capital and second only to the United States Steel Corporation in this respect.

President W. C. Durant, president of the General Motors and the Chevrolet Motor company, will continue as head of the two companies. E. I. Du Pont-De Nemours & Co. are now represented on the board of directors of the General Motors Corporation by Messrs. J. A. Haskell, J. J. Raskob, P. S. Du Pont, Irene Du Pont and Henry F. Du Pont. The last two named directors were elected Feb. 21. Mr. H. M. Barksdale, vice president of E. I. Du Pont-De Nemours & Co., is a director of the Chevrolet Motor company.

President Durant, following the meeting, announced that the increase in capital stock as recommended to the stockholders provided for an authorized capitalization of \$50,000,000 six per cent. preferred stock and \$150,000,000 common stock. At present there is authorized \$20,000,000 of the preferred stock and \$82,600,000 common. It was also recommended to the stockholders that an offer be made to purchase the assets of the Chevrolet Motor Co., exclusive of its stock holdings in General Motors Corporation, paying therefore 282,684 shares of the common stock of the General Motors Corporation. This stock, together with the 450,000 shares of General Motors common stock now in the treasury of the Chevrolet Motor Co. will amount to 732,684 shares, or one and one-seventh shares of General Motors Corporation common stock for each share of Chevrolet Motor Co. stock now outstanding.

General Motors stockholders will hold their next meeting on March 20, when it is expected that favorable action will be taken on the recommendations of the directors.

KEMP DISTRIBUTES KINGSTON SPECIALTIES.

William E. Kemp, 1731-37 Broadway, New York City, distributor of Kingston specialties, will handle the distribution of products of the Byrne, Kingston & Co., and Kokomo Electric Co., Kokomo, Ind., throughout the New England territory. Under this new arrangement more efficient repair and delivery service will be afforded the users of Kingston carburetors, magnetos, spark coils, spark plugs, switches and other products.

A large stock and repair station will soon be established in Boston which, in conjunction with the large, well stocked Kemp service station in New York, make possible greatly improved service on Kingston products.

C. M. BROWN AGAIN HEADS N. Y. DEALERS' ASSOCIATION.

The Automobile Dealers' Association, Inc., New York City, held a meeting of the directors for the purpose of electing officers. C. M. Brown was elected to serve another term as president. William G. Poertner was re-elected vice president and William Parkinson was re-elected treasurer. The board of directors consists of C. N. Brown, the Winton Co.; Frank Carle, Marmon, N. Y. Co.; Harry De Bear, Maxwell Motor Co.; E. S. Hare, Packard Motor Car Co.; R. H. Johnston, White Co.; William Parkinson, Stutz Motor Car Co.; William C. Poertner, Poertner Motor Car Co.; Charles E. Reiss, Charles E. Reiss Co.; A. G. Southworth, Buick Co., and Walter A. Woods, Van Cortlandt Vehicle Co.

Ford Car Prices Are Advanced \$90.00

Touring Car now \$450, Runabout \$435, and Chassis Has Been Raised \$75 in Price to \$400.

The Ford Motor Co. has announced an increase in price of \$90 on the touring and runabout models and \$75 on the chassis. The new prices, which have gone into effect, will be as follows: Touring, \$450; runabout, \$435; chassis, \$400.

No announcement was made by the company in the nature of an explanation of the advance, but it is generally understood that the rising materials markets have made the increase imperative. The company has made a substantial reduction in its output, the present production totaling about 1600 cars a day, representing a curtailment of about 40 per cent.

WILLIAM H. JOHNS HEADS GEORGE BATTEN CO., INC.

William H. Johns has been elected president of the George H. Batten Co., Inc., of New York, to succeed the founder of the company, who recently died.

Mr. Johns is one of the best known men in the advertising field and has been associated with Mr. Batten since 1888. He became a partner in the Batten company in 1892 and has been vice president since that time.

He was recently appointed chairman of the divisions of advertising of the Committee on Public Information, the division created by President Wilson.

**REGISTRATION BLANK HOLDER.**

(Figure 378.)

An automobile driver who is always thoughtful and tries to obey the law to the spirit as well as to the letter, gives this suggestion for the holding of the registration blank. He says that it eliminates the uncomfortable feeling that the blank has been left in the shop and that it is easily accessible for the traffic officer's inspection. Provide a small picture frame such as is made either for pictures or mirrors and frame the blank. Screw the frame to the seat board be-

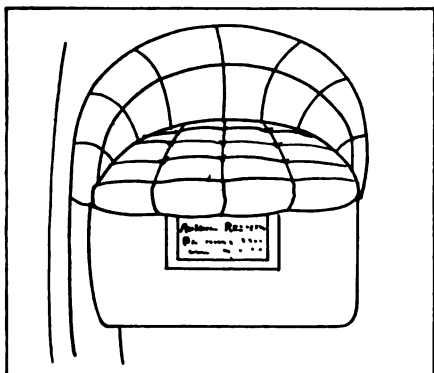


Fig. 378—Registration Blank Holder.

neath the cushion. If the board is removable or on hinges, mount the blank on the underneath side. The law in many states rules that the blank must be with the car. This complies with the law in every respect and should be both a comfort and a time saver.

HOLDING SMALL DRILLS.

(Figure 380.)

A big problem with the repair man is the keeping of small drills in order. The ordinary circular stack arrangement is not always the most practical method. Then, too, the car owner may not care to keep a full set, at the same time he does not care to throw them indiscriminately into a box and trust to luck to find the right size when he wants it. We illustrate herewith a unique, practical and easily constructed case for holding drills of practically any size. It is easily made from two pieces of soft wood about six inches square or any convenient size. Clamp two such pieces together as shown in the first cut and bore a series of holes, the larger slightly greater in diameter than the biggest drill. The holes need

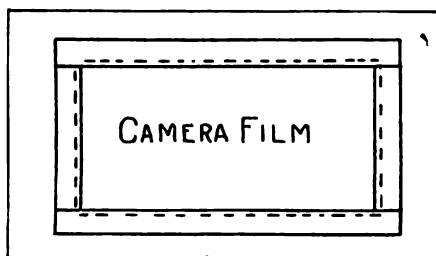


Fig. 379—Curtain Light.

not be drilled through to the opposite end, but stop at different points. When the two pieces are separated a half circular shaped groove will be found in each piece. Nail a thin strip of wood on the open end and you have a serviceable drill holder. By cutting one block slightly shorter than the next they may be stacked one on top of the other in the tool kit.

CURTAIN LIGHTS.

(Figure 379.)

Broken celluloid windows in the storm curtains and the back of an automobile present an unsightly appearance and detract from the beauty of the car. The replacement of the lights is a simple matter, and, if the following directions are carried out, such a replaced light is often better than the original piece of celluloid,

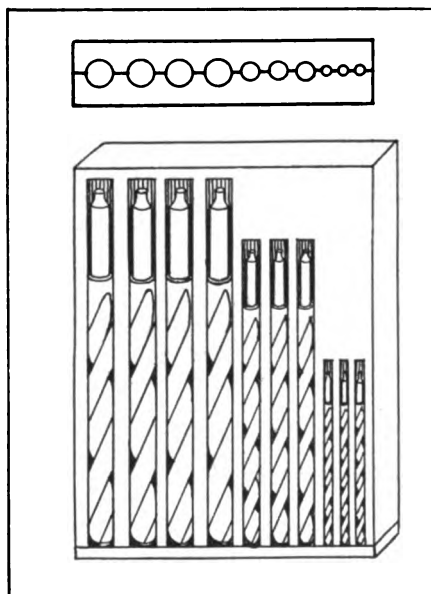


Fig. 380—Small Drill Holder.

for the reason that the material used is nearly glass clear. Obtain an old or used camera film of sufficient size to cover the window opening. Bind it all the way around with dressmaker's tape and sew it to the tape. It is an easy matter to sew the tape binding to the curtains and back of the car, and the result is a clean, white window. The coating may be removed from the film by immersing it in boiling water.

GASOLINE TANK FITTING.

(Figure 381.)

Do you feel sure of the gasoline supply from the tank to the carburetor on your car? If it is gravity feed, then

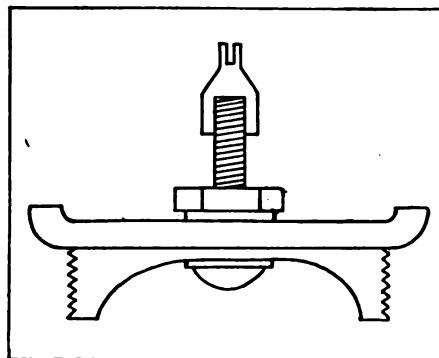


Fig. 381—Gasoline Tank Fitting.

sooner or later the supply may fail, either because of an especially steep grade, or because of the clogging of the supply pipe. The accompanying illustration shows an easily constructed device which should be in the tool kit of every motorist. Obtain an extra gasoline tank filler cap and through the centre, bore a hole large enough to allow the insertion of an ordinary valve stem. Put the stem into position as shown, clamping a rubber washer on each side of the cap, so as to make the fitting air tight. When the gasoline supply is cut off for any reason, screw the cap into place and pump in a supply of air with the tire pump. The pressure will dislodge particles of waste or dirt which may be lodged in the fuel line.

STARTING RUSTY SCREWS.

Because of exposure and weather conditions, wood screws used in the body of an automobile rust into place so that it is a difficult matter to remove them

without breaking the heads. When in this condition they often may be removed by the following method: Heat a piece of iron, or soldering copper to nearly red heat and place it against the head of the screw. The heat transferred to the screw expands it, compresses the wood and when cool the screw may be removed easily, as the wood does not contract so quickly as the metal. Before replacing screws it is a good plan to coat them with either oil or soap. They may be turned into place easier and the removal if necessary at any time is facilitated.

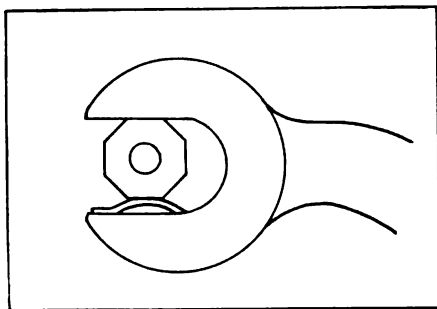


Fig. 382—Replacing a Nut.

REPLACING NUTS.

(Figure 382.)

Until the "ideal" automobile is designed with every nut and pin on the dashboard, the repair man and motorist will be confronted with the problem of replacing nuts in almost impossible places. Over this small problem much time is wasted and patience worn to a sharp edge. After many vain attempts with a screw driver and a wrench the amateur often gives up in disgust, leaving the nut in the tool kit, and "taking a chance" with the machine. The illustration gives a hint as to a perfectly simple solution to the difficult feat. Bend a thin piece of spring brass or steel into a curve, insert it with the nut in question in the wrench and the nut may then be placed into position and screwed up before the spring is removed.

VALVE SPRING REPAIR.

(Figure 383.)

An extra valve spring is a mighty handy thing to have on hand at all times,

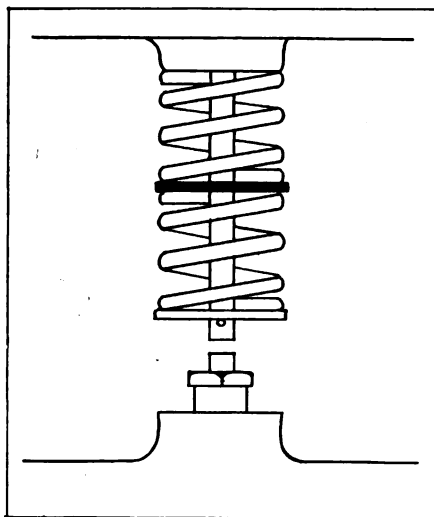


Fig. 383—Valve Spring Repair.

yet few motorists carry one along for the tour. The breaking of the valve spring puts one of the cylinders out of commission for the time being, thereby reducing the engine power to a great extent. A suggestion is given herewith for a temporary repair where a replacement is impossible. Remove the lower half of the broken spring and slip an iron washer over the valve stem, then replace the broken part of the spring. The washer prevents the two parts from slipping together, making a repair which is nearly as efficient as a new spring.

DIFFICULT STARTING.

(Figure 386.)

Few motorists are in favor of cranking a car for exercise, neither is this form of exertion to be recommended. In many cases the cause for difficulty in starting a gasoline engine arises from the fact that gasoline does not vaporize and mix with the air in sufficient quantities to make an explosive mixture. The flooding of the carburetor does not always effect a cure, as the air simply passes over the pool of gasoline without carrying any gas along with it. An easy method which seldom fails is to wet a sponge with gasoline and hold it in front of the air intake of the carburetor while the engine is being cranked. The passage of air through the sponge usually collects the liberated gas and an explosive mixture is formed.

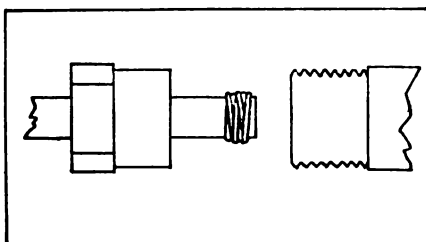


Fig. 384—Temporary Packing.

TEMPORARY PACKING.

(Figure 384.)

Though rubber is soon destroyed by the action of gasoline, it is possible to use it for packing unions on gasoline and oil lines in the automobile. Small rubber bands are easily applied and when twisted around the pipe as shown leave no loose ends to get between the threads and cause a leak. This sort of a packing will not last as long as cotton, but if well coated with shellac and tightly clamped by the union will last for some time and replacement may be effected in very short time.

GARAGE TURNTABLE.

(Figure 385.)

Though a garage turntable is unquestionably a big asset, not every owner is able to have one. Because of garage construction a fixed turntable is not always practical; in either case the turntable shown in the illustration should be of much use either to the private owner or the public garage man. This device is so constructed as to allow its use in any part of the shop; with it an automobile may be moved in any direction, or

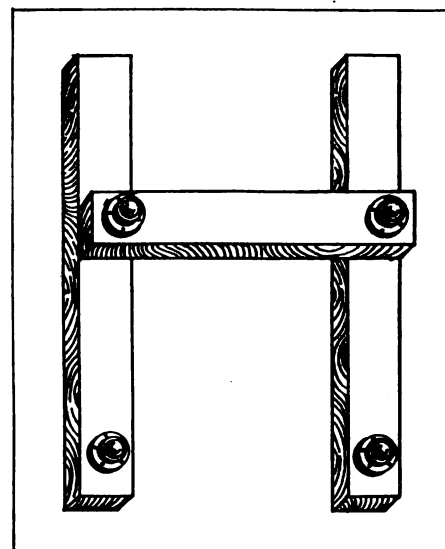


Fig. 385—Garage Turntable.

turned around with a minimum amount of effort. The construction is simple, it being made of three planks and four or more casters of the roller ball type, which permit movement in any direction. The main ways, or tracks, should be made of 4x8 inch planks, about 11 feet long and spaced with centres 56 inches apart. The cross piece should be about two inches thick and four inches wide, firmly bolted to the rails. Illustration shows view from lower side.

WHEEL ALIGNMENT.

Improper wheel alignment results in two things; the wearing of tires and difficulty in steering. In many instances drivers have noticed that one of the front tires seemed to be wearing faster than the other or that when the car was running on one side of the road it was difficult to get into the centre or turn a corner. Such troubles may often be traced to improper wheel alignment, and it is the duty of the garage man to remedy the trouble. The location of the trouble is not difficult if the garage floor is ruled and painted with two white lines 60 inches apart. The car is driven over the lines, the front wheels straightened and a plumb bob dropped from the circumference will indicate any misalignment. This method is considerably easier than lining up with pieces of string and takes much less time. Bad cases may be noticed even as the car passes over the lines.

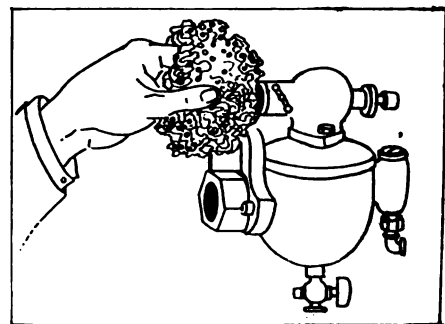
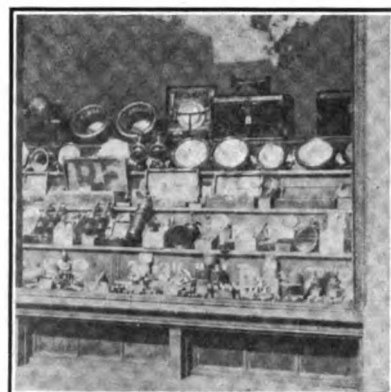


Fig. 386—A Remedy for Difficult Starting.



Accessories Department



SPOK TITE.

One of the elements of danger, always present where a car is kept in a heated or dry garage arises from the contraction of the wood spokes and wheel rims. With the construction comes the loosening up of the whole wheel and sooner or later the wheel is very apt to collapse and cause much damage, possibly the loss of life.

Spok Tite is a liquid preparation which is said to be uninjurious to painted or varnished surfaces and when applied causes the wood to swell and resume its normal proportions. The can is furnished with a handy spout and upon signs of looseness in the wheels a few drops of Spok Tite are squirted into the crevices formed by the drying up of the wood. The wheels may be left in place for the treatment and the action of the liquid is rapid.

Distributed by Charlie Foster, 243 Columbus Ave., Boston, Mass. Write for prices.

HORSEY'S DOLLAR VULCANIZER.

A recent innovation in the vulcanizing field is the introduction of a chemically treated heat unit for vulcanizers. When this unit is used gasoline and its attendant dangers may be dispensed with in repairing inner tubes by the vulcanizing method.

The Horsey Dollar Vulcanizer is designed to use the chemical heat unit type of tablet. The device consists of a heating box which is located directly beneath the vulcanizing block, a construction which permits the conservation of all heat.

The vulcanizing block is fitted with a concave pressure block, which is designed to vulcanize the patch 1/16 inch thick in the centre, tapering to the edge, so as to conform with the curve of the tube.

With the vulcanizer is packed eight patches, eight heat unit tablets, sandpaper, cement and full directions for use. Extra patches are packed in boxes with eight heat unit tablets, eight patches, sandpaper, cement and directions.

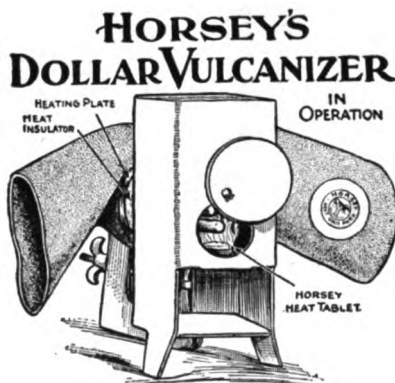
Manufactured by Horsey Products Co., Cleveland, O. Price for vulcanizer outfit \$1. Price for patch outfit only 50 cents.



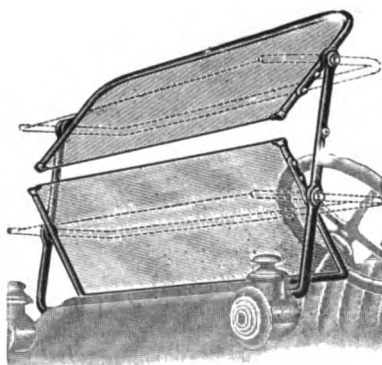
Spok Tite.



Dover Soldering Iron.



Horsey's Dollar Vulcanizer in Use.



OSPECO
PAT. PEND.
Ospeco Windshield Parts.

OSPECO WINDSHIELD PARTS.

The motorist is beginning to look forward to the approach of spring and to fit his car for the coming season. Among the interesting accessories on the market is the Ospeco Windshield device, whereby the ordinary stock Ford windshield may be converted into a full ventilating shield with both upper and lower halves movable on pivots.

Ospeco Windshield Parts are two large ornamental castings, which are so designed that when fastened to the dash the Ford windshield is removed and replaced in the castings as shown in the illustration. By this means the car may be brought up to date and present a neat appearance.

Manufactured by the Michigan Auto Products Co., Detroit, Mich. Price, \$5.

DOVER SOLDERING IRON.

There is one little device that is practically indispensable around a garage or repair shop, a soldering iron. Not only is this valuable to a mechanic, but also to a car owner, for there is always something about the car or house that needs repairs. Illustrated herewith is an electrically heated iron that has many advantages over the old style which had to be heated over a gas flame or in a stove.

The Dover electrically heated iron consists of a Veal heating unit tightly enclosed in a steel tube to prevent damage from careless handling. A flanged copper core runs the full length of this heating element and is connected with the soldering tip. Around the core is a vitrified clay tube upon which is wound the resistance coils. The Veal insulating material, which is said to be a non-conductor of electricity, but a good conductor of heat, is forced in between the vitrified tube and the copper core, and between the coils and the steel casing, under hydraulic pressure, which prevents all danger of burning out coils.

The iron is so designed that the tips may be removed for replacement or for changing with other styles of tips. Irons may be obtained wound for any voltage ranging from 50 to 250, and in various sizes, for heavy or light work.

Manufactured by the Dover Manufacturing Co., Dover, O. Write for prices.



CORK INSERT BRAKE LINING.

The cork insert principle, which has proved so successful in transmission linings and fan belts for Ford cars, has now been tested and been applied to brake linings for big cars.

This product is made of the highest grade fabric, into which discs of cork are inserted. Cork forms an excellent friction material for this work, giving a smooth braking action, and is interesting because of its high resistance to oil and water penetration. Another point in its favor is that it does not swell under the action of elements and thereby make braking action uncertain.

That cork insert brake lining is suitable for brakes of large cars is evidenced by the fact that a Chicago taxicab company has been testing the product on heavy cars for over six months and they claim that as a brake lining the cork insert is one of the best.

Manufactured by the Advance Automobile Accessories Corporation, Dept. J3-1, 56 E. Randolph St., Chicago, Ill. Write for prices.

WOODWORTH TREADS.

With the steady climb of fuel prices comes the increase of tire cost, so that the motorist today is face to face with the problem of getting all possible wear from his tires.

The Woodworth tread offers the owner an opportunity for using up his badly worn tires. This is a steel studded, leather cover, made of special water proof, non-stretching, non-cracking leather, which is attached over the old tire, on the wheel, by rings on each side of the tread.

It is said that the equipment is practically puncture proof and that it protects the tire from road wear and bruises. Being kept tight on the wheel the tire is not subjected to chafing or its attendant heating.

Another point claimed for this device is that it offers a non-skid surface to an old tire. It is made in two styles, centre studded, with studs only on the middle portion and full studded, with studs in centre and thin head rivets on the sides to protect against rutty, rocky or frozen roads.

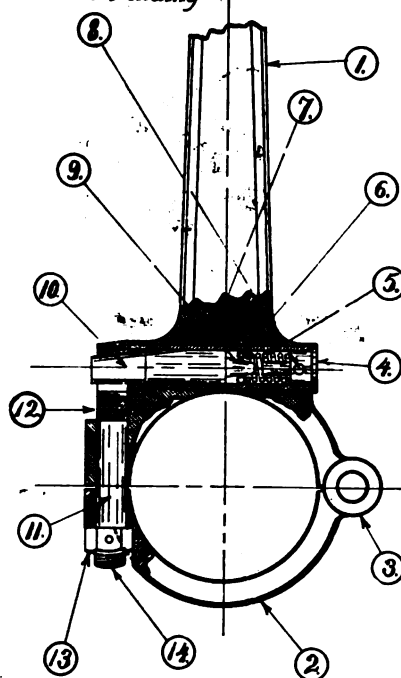
Manufactured by Woodworth Manufacturing Corporation, Niagara Falls, N. Y. Write for prices.

SELF-ADJUSTING ROD BEARING.

Patent rights are now pending on a new and novel form of connecting rod bearing which is applicable to practically any type of gasoline engine. This device is claimed to be self-adjusting, a feature that should be of great interest to all users of cars who are obliged to make bearing adjustments frequently.

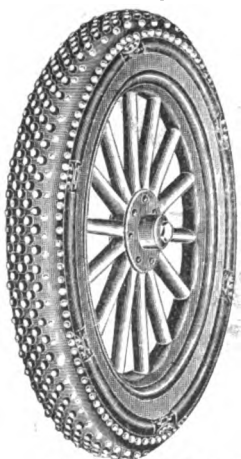
Reference to the accompanying diagram will show that the rod is of conventional design, but fitted above the bearing with a horizontal bolt, 10, which is beveled at one end, slides in a bushing, 7, and is fitted with a ball and spring lock arrangement, 6 and 5, the ball and spring being retained by the cover adjustment, 4. The bearing cap, 2, is hinged at one side, 3, and fitted with a sliding bolt and nut, 4 and 13, the upper end of which is slotted and hooked over the horizontal bolt, 10.

Patent Pending



Self-Adjusting Rod Bearing.

The connecting rod is put into place as usual and the play taken up by the nut 13. As the bearing wears, by constant vibration, the bolt 11-14 works upward, keeping the cap securely and



Woodworth Tread.

tightly around the crank pin. Every upward movement of the bolt allows the horizontal bolt, 10, to work outward, thus clamping the bolt, 11, and preventing it from moving downward. The horizontal bolt, 10, cannot work back against the spring because it is locked in place by the ball lock, 6, the whole action compensating for any wear in the crank-pin. It is now the intention of the designer to place the rod on a royalty basis and anyone interested is requested to write to the address below.

Charles C. James & Co., 1 Wall St., New York City. Write for full particulars.

THE STEWART HANDY WORKER.

A handy device which should be of great value in any repair shop or private garage is known as the Stewart Handy Worker. Complete, the device weighs 90 pounds and is, primarily, a vise. Such is the construction, however, that many tools are combined with it.

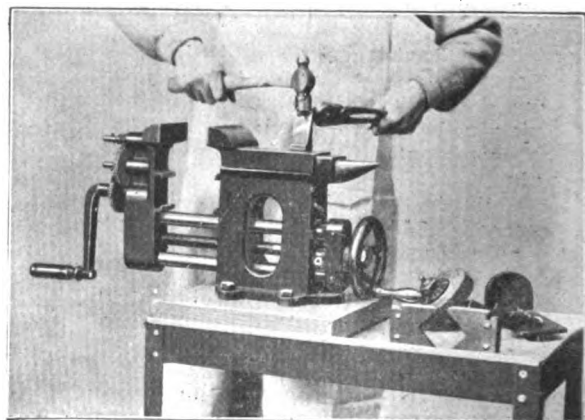
As a vise the jaws open to 4½ inches and being faced with steel, are practically indestructible. The jaw opening mechanism is operated by a hand wheel and screw, the sliding jaw being supported upon two heavy round pieces of cold rolled steel.

The sliding jaw is fitted with a three-gear reduction spindle, with provision for handle upon each gear. The upper spindle extends through the jaw and is fitted with device for holding square shank drills, thus forming a drill press. With the device is furnished an adjustable arbor upon which may be mounted an emery buffing wheel, or scratch brush.

The rear jaw, which comprises also an anvil, is removable and fitted with metal cutting tool. With the jaw removed and an L fitting substituted, a drill press is formed.

An extra pair of toothed pipe jaws fit between the vise members, forming a substantial pipe holding device. Complete with all fittings the machine may be said to have an unlimited range of work, and as it is substantially constructed, will withstand considerable hard usage.

Manufactured by Chicago Flexible Shaft Co., 12th St. and Central Ave., Chicago, Ill. Price, \$14.



Stewart Handy Worker in Use.

AC SPARK PLUG DISPLAY STAND.

Most people recognize spark plugs as essentials for the engine operation and dealers realizing that there is always a demand for this necessity, fail to display plugs in their show cases. Knowing this fact the makers of the well known AC spark plugs have designed a neat and attractive show case for dealer's use.

This show case, which is illustrated herewith, is 20 inches wide by 39 inches high and has space for 500 plugs. It is substantially made and has an attractive light oak finish. Any dealer desiring further particulars and special proposition is requested to write the makers.

Manufactured by Champion Ignition Co., Flint, Mich.

FORD TRANSMISSION REAMER.

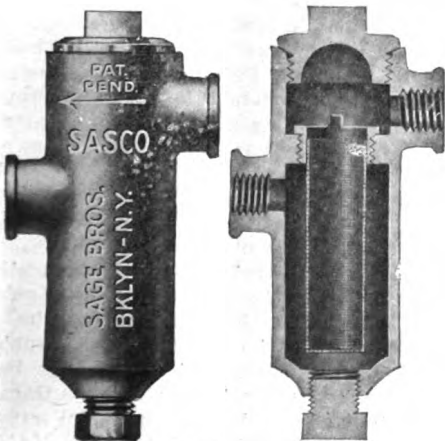
The holes in stock repair bushings for Ford cars are purposely made slightly small, so that they may be reamed to fit other standard parts, or left as purchased to fit worn parts. The machine illustrated is called the Wilson's Ford Transmission Bushing Reamer, and is designed so that new bushings may be placed in the three transmission drums, the drums put into the reaming machine and the bushings reamed to fit.

It is claimed that with this machine there is absolutely no danger of reaming the bushings out of line and that 25 minutes will suffice for making a complete job. With the machine is furnished at a slight additional charge a device for reaming the triple gears.

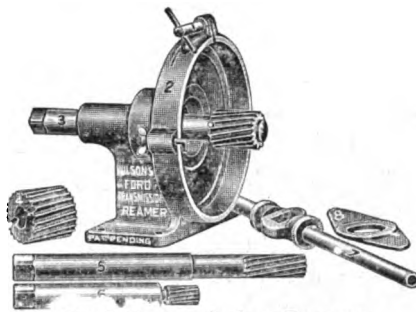
Manufactured by R. R. Wilson, 1018 Main St., Buffalo, N. Y. Price complete, \$50; with triple gear attachment as shown, \$60.

BUL-ZI NUT.

The standard Ford electric horn equipped car is fitted with a horn button located on the steering column below the steering wheel. Many Ford drivers find this location inconvenient and are not able to reach the button to sound an alarm, in an emergency case. The Bul-Zi Nut is a little device in the shape of a heavy iron washer, which replaces the present steering wheel nut, on top of the wheel. This washer is



Motor Sasco Strainer.



Ford Transmission Reamer.



Bul-Zi Nut.

shaped the same as the base of the horn button and is tapped to take the regular horn button screws. By means of the Bul-Zi Nut the horn button may be adapted to the centre of the steering wheel, in a position convenient to any driver, and reached in a minimum amount of time.

With the device is furnished two lengths of wire for extending the horn wires, and full directions for installation.

Manufactured by Bul-Zi Nut Manufacturing Co., Kansas City, Mo. Price 25 cents. Liberal discount to dealers. Write for terms.



AC Spark Plug Display Stand.



SMITH AUTO SIGNAL.

The traffic in our cities is daily increasing, and many problems come up, which are due to congested conditions. To eliminate the confusion, caused by sudden stopping, turning, etc., of automobiles on the highway, the Smith Auto Signal has been designed.

This device is mounted on the left rear mudguard and is visible from both front and rear. Two sides are fitted with the words Left, Right and Stop, each of which is illumined by an electric light. Each light is controlled by a plainly marked, single handle, three-way switch, which may be mounted in the car at any convenient point.

A feature of the device is a buzzer enclosed in the switch, which indicates whether the lights are functioning properly or not. Since the device is fitted with front and rear lettering, it indicates the intention of the driver to the traffic officer, as well as to the driver of the car following.

Manufactured by Smith Signal Corporation, 53 West 66th St., New York, N. Y. Price complete with wiring, \$17.50.

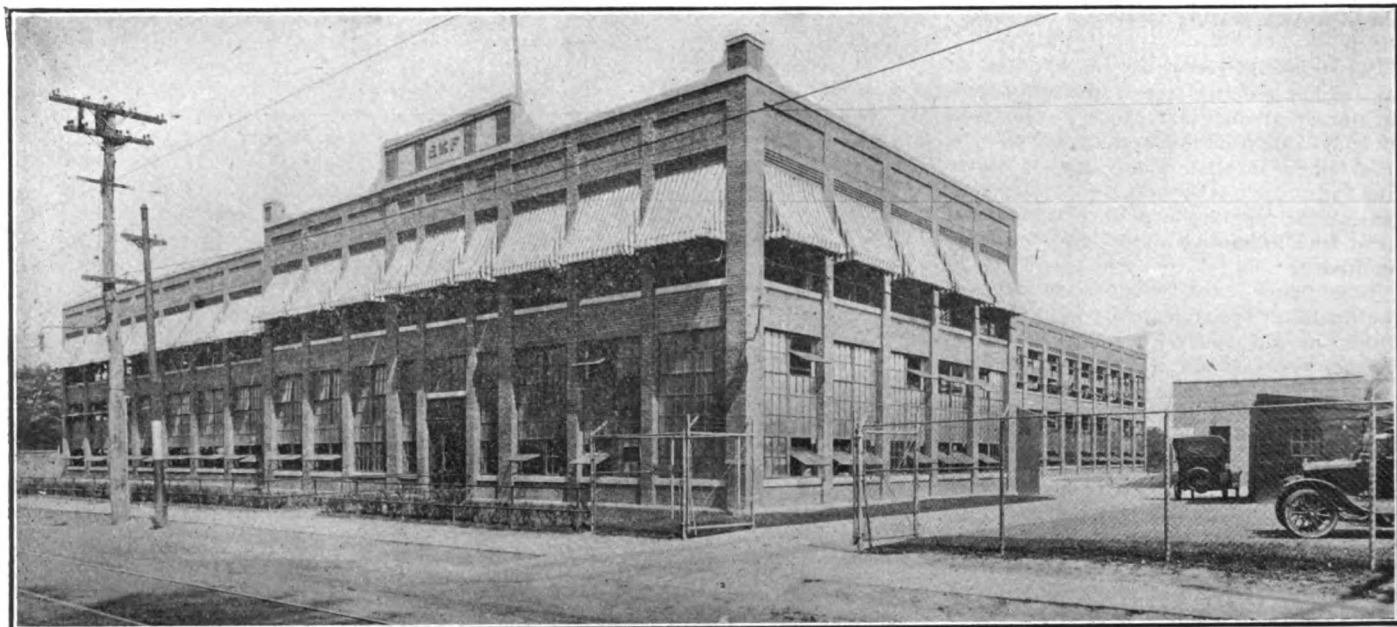
MOTOR SASCO STRAINER.

The Motor Sasco Strainer has been designed to meet the demands of the public for a device that will eliminate the trouble so often caused by the accumulation of dirt in the carburetor. In the construction of this strainer the basket mesh is so designed that should two-thirds of the capacity become filled with sediment or dirt the full area of the pipe line would still be maintained. The gasoline entering the upper port causes all dirt and sediment to be retained in the basket.

To clean the device a few turns of the ground joint top cap gives the operator access to the strainer basket which can then be removed, cleaned and replaced within a few seconds.

The space from the bottom of the outlet connection to the bottom side of the strainer forms a large reservoir or trap for the settlement of such water that may be in the gasoline, and for its removal a drain plug is provided. The device is manufactured of aluminum in two sizes, the number 00 for all general purposes where the tubing does not exceed 5/16 inch outside diameter, and number 0, for larger sizes.

Manufactured by Sage Brothers, 780 Union St., Brooklyn, N. Y. Write for prices.



Large Modern Ideal Plant of the SKF Ball Bearing Co., at Hartford, Conn., Where SKF Radial and Thrust Ball Bearings Are Manufactured.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration

The Champion Ignition Co., Flint, Mich., during the first month of the present year broke all its former sales records and the business in the first two weeks of February was also ahead of the previous month's record. Albert Champion, president and general manager of the company, attributes the increased sales to the new AC carbon proof plug, which has only been on the market for about two months and is already the largest seller of any plug in the AC line.

The Chandler Motor Car Co., Cleveland, O., is planning the erection of a large addition to its plant to handle a big order for tractors recently received from the government. The contract is reported to call for from \$10,000,000 to \$14,000,000 worth of tractors, which will be supplied to the Allies by the United States.

The Homer-Laughlin Engineers Corporation, Los Angeles, Cal., has taken over the auxiliary transmission for Ford cars and trucks, which was formerly called the "Langbein." It will hereafter be marketed as the Laughlin-Langbein transmission.

The Miller Rubber Co., Akron, O., reports net earnings for 1917 of \$831,271. At the annual meeting it was decided not to declare a stock dividend that was proposed and the following directors were elected: Jacob S. Pfeiffer, William F. Pfeiffer, Frank B. Theiss, C. T. Grant and J. M. Doran. Jacob S. Pfeiffer was re-elected president, C. T. Grant vice president and William F. Pfeiffer secretary and general manager. Frank B. Theiss was elected treasurer.

The Paige-Detroit Motor Car Co., Detroit, Mich., has made an offer for the entire business and assets of the Signal Motor Truck Co., which is said to be sufficient to pay all the latter company's debts and cover its valuation.

The Hale & Kilburn Co., Philadelphia, has been reorganized as the Hale-Kilburn Corporation.

The Republic Truck Co. of Boston has been formed to take the agency over from the Linscott Motor Co. in that territory. G. A. Patten and J. H. Linscott will be identified with the new company as president and treasurer respectively. Mr. Patten and Mr. Linscott have been associated with each other for 25 years, first in the bicycle business, and then as distributors of Reo cars. The new company is at present located at 570 Commonwealth avenue, pending completion of a new four-story building which will be devoted entirely to Republic sales and service. This is located at 29-33 Brookline avenue and is expected to be completed within two months. The concern will appoint dealers in almost every city in Maine, New Hampshire, Vermont and Massachusetts.

The Haynes Wheel Co.'s profits for the year ending Dec. 31 were \$767,351. The company's sales aggregated \$8,674,370.52, and the manufacturing cost was \$7,907,018.66. After making discounts on purchases from which cash discounts on sales and minor losses were charged, a gross income of \$788,012.35 was left. Deductions of interest brought the net income to \$750,685.31 before making provision for federal income and excess

profit taxes. After setting apart \$270,000 as reserve for federal income and excess profit taxes and distributing \$160,000 in dividends, a balance of \$315,685.31 was carried to surplus, increasing accumulated surplus to \$754,083.40, after which various adjustments, including writing off \$76,652.71 on patent rights and good will and appropriating \$38,411.49 to cover the unamortized portion of discount Jan. 1, 1917, on the company's outstanding five per cent. gold notes, reducing to \$641,340.01 the total surplus for the year.

The Harroun Motors Corporation reports gross assets of \$11,186,768.26 for the year ending Dec. 31. These are divided into capital assets, consisting of land and buildings, machinery and equipment, tools, dies, etc., of \$1,348,295.13; patents, models and good will, \$7,006,887.01; treasury stock, \$2,155,930. Current assets, including inventory, are \$277,286.09; cash on hand, \$157,068.10, and together with accounts, notes and investments total \$660,263.45. Prepayments, covering advance insurance, travelers' expenses and advances on ordinance contracts are \$15,392.67. Liabilities include capital stock, \$10,000,000; deferred liabilities, \$784,462.40, with current liabilities of \$395,375.86.

The H. J. Koehler Motors Corporation, Newark, N. J., makers of the Koehler 1½-ton truck, have announced the appointment of the following new agencies: Pittsburgh Motor Sales Co., 5920 Penn avenue, Pittsburgh, Pa.; Bailey's Garage, Main and Mechanic streets, Westfield, Mass.; Baker-Riedt Motor Co., McAlester, Okla.; L. S. Lerch, Easton, Pa.

The Ajax Rubber Co., New York City, reporting for the year, shows an increase of 63½ per cent. in sales and of 65½ per cent. in net profits over the previous year. The percentages are arrived at by allowing for the volume of business done by the Racine company during the short period in 1917, before it was taken over by the Ajax company. Gross sales during the year for the combined companies amounted to \$14,849,525 before deducting cash discounts, freights and allowances. After writing off the usual bonuses to employees and liberal deductions for depreciation and bad debts, there remained a net gain of \$1,955,293, before deduction of excess profits taxes. Wm. G. Grieb, president of the company, in his annual report stated in part: "Additions have been made to both our plants at Trenton, N. J., and Racine, Wis., amounting to \$683,539.60, covering new buildings, machinery, moulds, etc., which your board of directors found to be absolutely necessary owing to the inability of the company to meet the demand for either Ajax or Racine tires during the past year. With this increased manufacturing facility at both factories it will enable us to produce at least 5000 to 5500 tires and tubes per day, assuming, of course, that we do not experience any undue setbacks. As most of the raw material employed in the manufacture of tires is imported from London, Egypt and the Far East, your directors have felt it to be most prudent and wise to carry a much larger inventory than has been found necessary heretofore, for our country's entry into the war has created a greater demand for ship bottoms, and the dangers occasioned from submarines adds to the difficulties of receiving materials regularly, so that a heavier inventory is reflected in the balance sheet than would be necessary in normal times. This inventory is, however, thoroughly and carefully matched up and much of it is purchased at prices considerably below today's market figures. The outlook is most encouraging as orders already booked for immediate shipment amount to more than 33 1/3 per cent. of the total volume sold during the year 1917."

The B. F. Goodrich Rubber Co., Akron, O., made the greatest earnings in its history in 1917 according to the statement presented to the stockholders at their annual meeting. The earnings totaled \$12,675,000, exceeding the earnings for 1916 by over \$3,000,000. The amount of the gross business done, however, was not made public, thus making it impossible to determine how greatly the increased costs of doing business reduced the ratio of profits. The company now has \$20,000,000 as surplus or undivided profits. Income and excess profits taxes are not allowed for in the earnings cited. These may reach \$2,250,000, which leave the net profit after all charges, \$10,245,000. In 1915 the net after charges amounted to \$12,200,000, but at that time there were none of the large tax payments to be met that now have to be paid. The regular preferred and common stock dividends have been declared. F. C. Van Cleef, attorney,

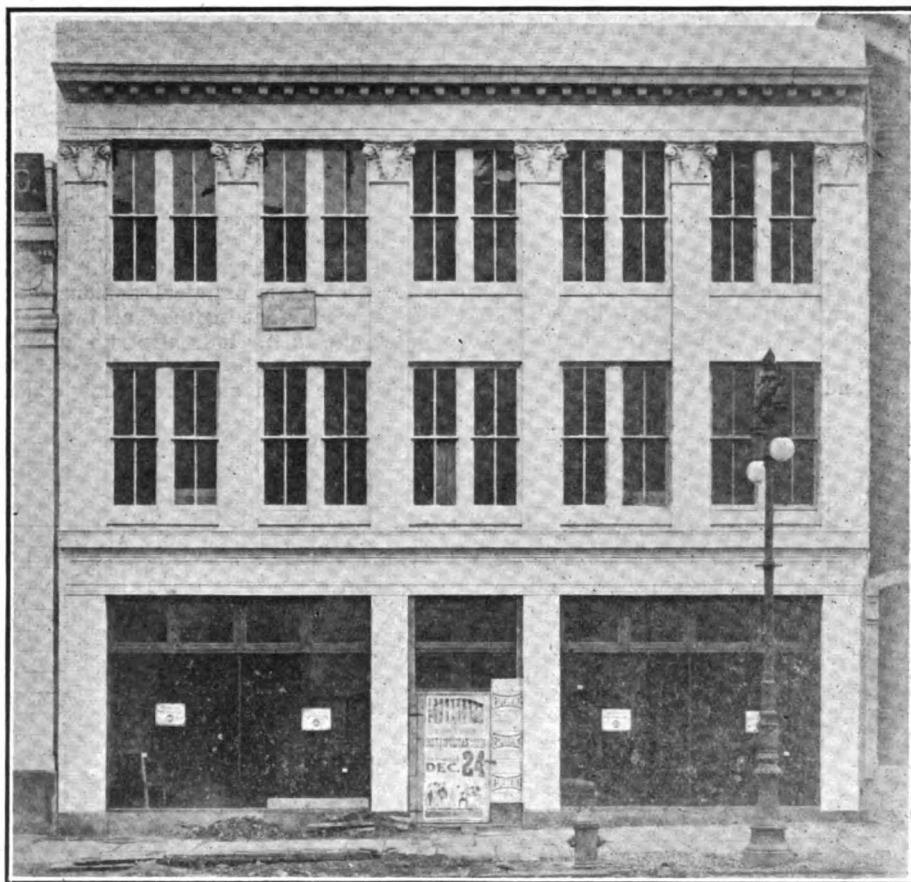
has been elected secretary of the company, succeeding Guy B. Norwood, who resigned to become president of the Republic Rubber Co. B. Hough was elected to the directorate to fill a vacancy. In accordance with the usual custom it was voted to retire 9000 shares of the preferred stock, which is being gradually retired out of earnings.

The Stewart-Warner Speedometer Corporation, Chicago, during 1917 earned \$2,200,774, after deducting all manufacturing, selling and administrative expenses, including doubtful accounts and depreciation, but not including excess profit and income taxes. After deductions for taxes and dividends there remained from the year's operations an unappropriated surplus of \$1,260,774. On Dec. 31 the surplus amounted to \$5,456,215. The company has current assets amounting to \$4,538,284, while its current liabilities are only \$1,119,890. The chief item among the current assets consists of \$3,062,003 in inventories, which are slightly greater in value than the plant that houses them, for it is carried at \$3,055,354 in the books. The net assets amount to \$6,321,408, exclusive of the item of \$9,134,806 credited to the intangible good will. President C. B. Smith in his report stated: "Our properties are being maintained in the highest state of efficiency. Considerable new machinery has been added to the equipment of the Chicago plant, enabling us to make prompt deliveries on all our contracts. Last spring we completed at Beloit a foundry building 480 feet in length and 120 feet in width, conceded

to be one of the best equipped foundries in the country, enabling us to make our own castings and to guarantee absolute delivery on all our contracts. We have included facilities at this foundry permitting us to take on outside contracts for castings, and we expect during 1918 to do a profitable business in that department. The outlook for 1918 is very promising. While recognizing the possibility of a reduction in the output of automobiles we believe this will be offset by an increase in sales on several new Stewart products incorporated in our line too late in the year 1917 to become known. We may also be able to announce in the near future one or more Stewart products. We are now testing some interesting devices that we hope will prove popular and profitable additions to the line."

The Kissel Motor Car Co., Hartford, Wis., has appointed the following dealers as distributors of the KisselKar: Grieb & Thomas, Philadelphia, Pa.; Strubbe, Henderson & Splain, Lincoln, Neb.; J. D. McNary & Son, Colusa, Cal.; Frietchen Garage, 63 S. Diamond St., Mansfield, O.; Consolidated Automobile Co. of Ohio, Dayton, O.; Ryan & Gottleber, Jackson, Mich.

The Motor Parts Co. has removed to its new location, 847-49 North Broad street, Philadelphia. The company formerly conducted business at 818 North Broad street. The new building contains more than 25,000 square feet of floor space. It is the third large building recently completed by the company to secure better service and distribution.



New Home of the Motor Parts Co., 847-49 North Broad Street, Philadelphia, Containing 25,000 Square Feet of Floor Space.

TWIN CITIES AUTOMOTIVE SHOW

Automobiles, Trucks, Tractors, Accessories and Industrial Products Are Included In Exhibits

THE Twin Cities Automotive Show, held in the Overland branch building, halfway between St. Paul and Minneapolis, was the first of its kind ever held, as not only automobiles, trucks, tractors, accessories and other products of the motor industry were exhibited, but also various mechanical devices and food stuffs. A new record for size was also established, the exhibits occupying approximately 268,000 feet of floor space.

In every respect the big exposition, which was probably the greatest of its kind ever held, was a huge success, as indicated by the optimistic spirit among the dealers exhibiting, as well as those attending, and was certainly an unqualified success in point of attendance, 178,270 people passing into the building during the seven days that the exhibit was open. It was a stupendous project from the start, but was conceived and put into effect in the short space of six weeks. While there were varied exhibits, it was primarily an exposition of the motor industry, as there were 46 motor car exhibitors, 40 showing tractors, 36 truck and truck accessory displays and 105 accessory exhibitors.

In addition to these exhibits there were various forms of amusement and recreation offered in the building, a feature which made the show a good business proposition. Thousands of farmers and dealers came from distant points and once in the building, usually stayed until the closing hour, 10 p. m. It was also a success from the viewpoint that several lines were exhibited which could be handled by dealers in comparatively isolated sections where a single line of either cars, trucks, tractors or gasoline engines for farm use would not be profitable. The promoters had this idea in mind as the dealer of the future in the rural sections will carry these allied lines, requiring similar methods of handling and service.

ESSENKAY A PRACTICAL SUBSTITUTE FOR AIR IN TIRES.

One of the most interesting exhibits at the large shows was that of the Essenkay Products Co., West Ohio St., Chicago, Ill., manufacturers of Essenkay tire filler, a substitute for air in tires.

Essenkay, which is a practical tire filler, is a compound that looks a good deal like the best Para rubber, but it contains no rubber, no glue, no gelatine, glycerine or other substance that deteriorates or is affected by heat, cold or water.

As a demonstration of its qualities,

is removed, the Essenkay springing back to its original size and quality.

The manufacturers claim that it is now being used by over 16,000 motorists, who no longer need worry about blow-outs, punctures, or other trouble incident to the use of air filled tires. These troubles are necessarily eliminated, as neither inner tube or air are used with Essenkay filler. It also adds many thousands of miles to the life of tires because a tire filled with Essenkay can be worn down to the last layer of fabric, and the Essenkay can be changed from one set of tires to another, easily outlasting a dozen or more sets of tires. It can be placed in the shoes with even greater ease than the fitting of an inner tube in place.

STATEMENT OF MUTUAL MOTORS INDEBTEDNESS.

Attorneys for the Mutual Motors Co. of Jackson, Mich., which was adjudicated



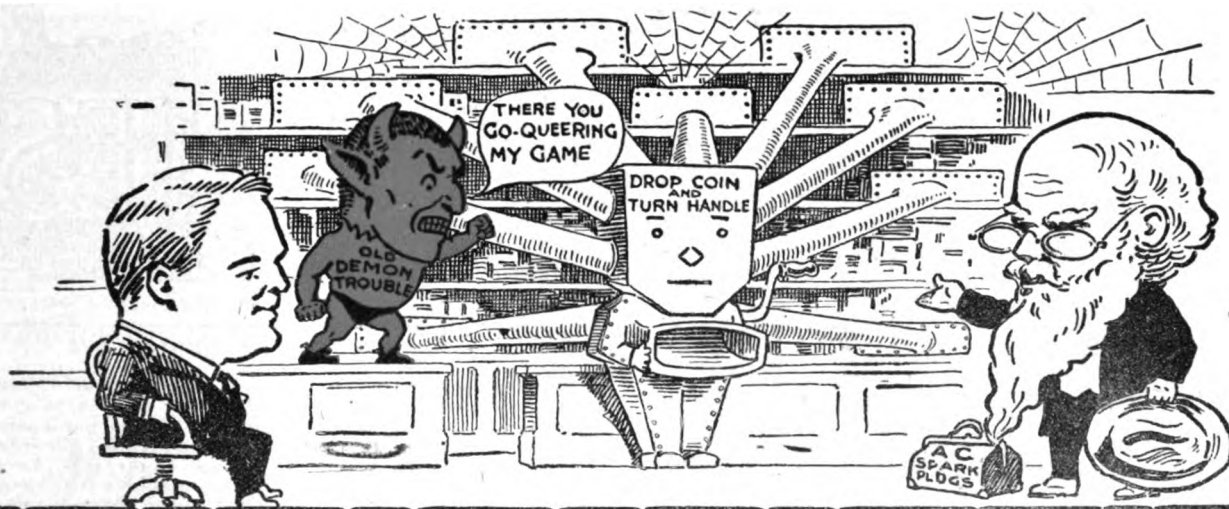
Twin Cities Branch of Willys-Overland, Inc., Where the Automotive Show Was Held, Containing 320,000 Square Feet of Floor Space.

Essenkay is immersed in a vat of boiling water side by side with another piece of Essenkay frozen in a cake of ice. This is a practical demonstration of the fact that neither cold nor hot water affects it. It is also shown under a pressure of thousands of pounds to the square inch and then the pressure

bankrupt several days ago, filed in the Federal court a statement of the debts of the company Friday. The total indebtedness for the firm is \$280,727, of which claims of \$47,000 and \$43,000, respectively, are secured. There are many unsecured claims. The larger creditors include two banks.



Automobile, Tractor and Truck Dealers, Guests of F. N. Coats, Manager of the Twin Cities Overland Branch, Gathered in Front of the Big Show Building, Prior to Drawing Space for Their Exhibits.

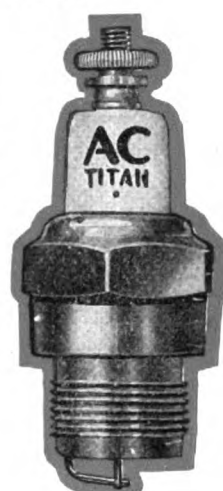


OLD MAN WISE — "DON'T MAKE A SLOT MACHINE OF YOURSELF — GET ACQUAINTED THROUGH RELIABLE GOODS THAT WILL ALWAYS BACK UP YOUR TALK — FOLKS COME FROM FARTHER AND BUY MORE THROUGH THE CONFIDENCE THUS ESTABLISHED."



AC Carbon Proof
For Fords
Overlands and
Studebakers

IF you want to "queer the game" of Old Demon Trouble, use AC Spark Plugs. They are standard equipment on all these leading cars—not because of "claims" but because of *conduct*: actual *performance* on all roads, whether for racing speed or steady grind. There's no reason why your car should not have the benefit of



$\frac{7}{8}$ in.
Regular
for
Maxwells
AC
Titan

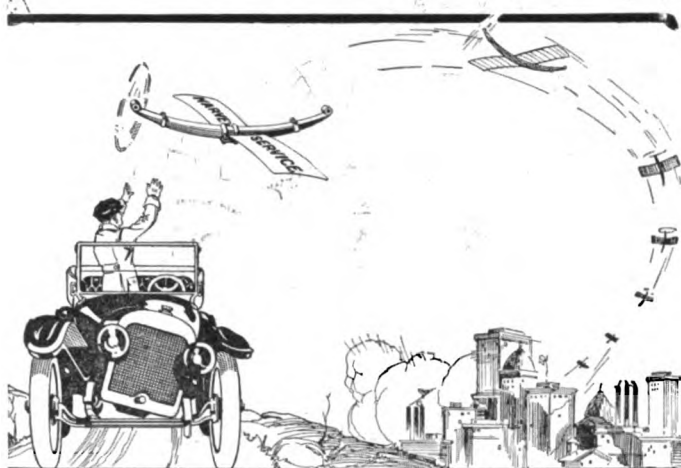
AC Spark Plugs
The Standard Spark Plug of America

CHAMPION IGNITION COMPANY
SOLE MANUFACTURERS, FLINT, MICHIGAN

These Manufacturers Use AC As Standard Equipment

Cadillac	Buick	Scripps-Booth	McLaughlin	Gabriel Trucks	Riker Trucks
Pierce-Arrow	Oakland	Crane-Simplex	(Canada)	Gramm-Bernstein	Stewart Trucks
Packard	Oldsmobile	Stearns-	American-	Trucks	Wisconsin Motors
Marmon	Nash	Knight	La France	Moreland Trucks	La Crosse Tractor
Hudson	Fissel Kar	Saxon	Davis	Wilcox Trux	Advance-Rumely
Chalmers	Premier	Stutz	Sanford	Sterling Trucks	Tractor
Hupp	White	National	Hatfield	Republic Trucks	Buffalo Motors
Chandler	Delco-Light	Stephens	Maytag	Diamond T Trucks	Continental Motors
Haynes	Murray	Jackson	Duesenberg Motors	F-W-D Trucks	Deere Tractors
Chevrolet	J. I. Case	Apperson	Dodge Brothers	G. M. C. Trucks	Northway Motors
Dort	Jordan	Anderson	Old Reliable	Sandow Trucks	Rutenber Motors
Cole	Liberty	Locomobile	Trucks	Signal Trucks	Sterling Motors
Reo	McFarlan	Daniels	Titan Truck	Brockway Trucks	Smith Motor Wheel
Paige	Paterson	Westcott	Ford Tractors	Samson Tractor	Van Blerck Motors
Peerless	Lexington-	Singer	Acme Trucks	Menominee Trucks	Wallis Tractors
Pilot	Howard	Dorris	Netco Trucks	Federal Trucks	Waukesha Motors

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Harvey to the Rescue

A broken spring—a frenzied customer calling for help—demanding a new spring “rush”! It’s an odd size; you have none in stock to match it!

And yet, you realize the importance of giving this customer real service, not particularly for the profit in this one job alone, nor even for the trade of this one customer, but because service at a time like this will bring the word-o’-mouth publicity which follows naturally when a customer is pleased.

So you call

Harvey
RACINE

to the rescue. There’s a Harvey Jobber near you, you get him on long distance, in a few words tell him your needs, and then turn to your customer with the satisfied feeling of work well done, because you know that already the exact spring you want and the best spring money can buy is speeding to you.

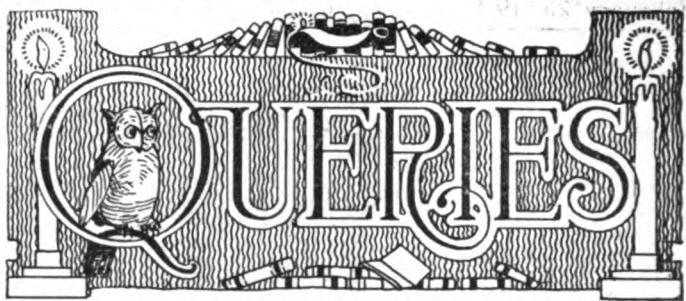
“That’s service”! says the customer. And when his car is on the road again he tells his friends about it and they say with him, “That’s service”!

That *is* Service, Harvey Service, and it’s always ready to help you build a business that will be respected far and near. They may forget the name of the spring you used but the memory of the service you have given will never be lost.

There’s A Harvey Jobber Near You

Drop us a card and we will send you his name and our Spring Book giving complete weights, styles, measurements and prices of over 900 different kinds of springs. Write today—you may need Harvey Help tomorrow.

Harvey Spring & Forging Co.
915 17th St., Racine, Wis.



NOTICE TO READERS.

THIS department contains the Mechanical Editor’s answers to readers’ inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer’s full name and address, and the car or part in question should be properly identified, by mentioning the maker’s name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW DO YOU KEEP THE TOP AND UPHOLSTERY OF YOUR CAR LOOKING WELL, AND HOW DO YOU REPAIR TORN PLACES?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 20th of March. The contest is open to every one.

REPAIRING CRACKED WATER JACKETS, ETC.

(R. L. Prindle, N. Abington, Mass.)

(Best Letter.)

At the present time a process known as welding, or autogenous welding, is a very satisfactory means for repairing cracked water jackets, cylinders or crank cases; in fact, practically any metal part of the chassis may be repaired by this method, thereby reducing the cost of repairs and, in many cases, obviating the need of replacement.

In minor cases, however, cracked jackets and cylinders may be repaired by the average owner with very good results. If the cracks are small the amateur may repair them with but very little trouble, and at a very low cost, without being put to the inconvenience of laying up his car for a long period.

One method used for the repairs of water jackets, which has proven highly successful, where the break is accessible, is applied as follows: The part to be repaired is thoroughly cleaned, so as to remove all traces of oil, dirt, rust, etc., then washed with gasoline and scraped with a stiff brush. Plug the water jacket inlet and to the jacket outlet attach the end of a rubber tube, connected with a suction pump. The writer uses an ordinary hand operated vacuum cleaner.

Mix up a rather stiff paste consisting of one part Smooth-On Iron Cement, No. 1 (a powder) and two parts Smooth-On Elastic Iron Cement No. 1 (a paste).

Next apply heat to and around the break by means of a gasoline torch, or by running the engine for a minute or so. With the engine warm, apply a small amount of the iron paste to the crack, beginning at the smaller end of the break and working toward the larger part. After a small amount of the paste has been spread and worked into the crack, operate the vacuum pump, so as to draw the cement into the

(When Writing to Advertisers, Please Mention The Automobile Journal.)

As a Watch Dog Guards Your Property

So a good lubricant guards the valuable property in your care.

Always ready to throttle friction, saving you many dollars in repairs and reducing gasoline bills.



The Exclusive Process Lubricant

stays with gears and bearings three times as long as common grease, giving perfect lubrication without freezing, hardening or melting until it is entirely consumed; leaves no gummy residue.

"K-00, special" grade for gears
"K-000," for bearings

The New York & New Jersey Lubricant Co.
165 BROADWAY, N. Y.

crack as far as possible. It is an easy matter to regulate the suction to suit the width of the fracture, and as the narrow part of the fracture requires more suction to fill it, it should be treated first, decreasing on the vacuum as the crack widens. Apply the cement a little at a time until the crack is completely filled.

After the cement has filled the crack a layer should be applied to the surface around the break and allowed to dry for a time. The cooling system may then be replaced in order and filled with hot water. If the engine is operated occasionally the drying of the cement will be hastened, though it is not well to use the car until the cement has dried thoroughly.

Where a break occurs in an inaccessible part of the cylinder the engine block must be removed, or if the break is in a removable head, this part may be taken off. The work of repair is as directed above, except in this case a blow torch must be used for heating the part prior to applying the cement. When the cement has hardened a stream from a hose or steam pipe may be turned into the casting to test it for leaks before the part is replaced in the chassis.

As a general rule repairs of this sort should be given two or three days to dry. Where a break cannot be repaired in this way it should be welded.

REPAIRING WATER JACKETS.

(F. Kramer, Perkasio, Pa.)

Second Best Letter.

From personal experience I have developed a method of repairing cracked water jackets which seems to work out very nicely. The broken place is first prepared by cutting a V groove along its entire length, the centre of the groove representing the crack. In this groove should be poured a solution of muriatic acid and zinc. (Soldering fluid made by dissolving as much zinc as possible in commercial muriatic, hydrochloric, acid). The side walls of the groove should then be rubbed with a copper rod, which should occasionally be dipped in the fluid until the walls are covered with copper. The casting should then be heated by means of a torch until ordinary soft solder will melt upon contact with the surface. If the instructions have been followed and the parts are clean and coated with the copper, the part may be soldered, for the solder will take very readily to the coppered surfaces.

By this method the writer has been able to solder practically any cast iron pieces and thereby save patrons much money.

Another method, which is sometimes effectual, is as follows: Clean the parts for about an inch all around the crack and brighten the metal. Then apply a coat of good orange shellac. While the shellac is still moist cut and apply a thin absorbent piece of tissue paper, so that it covers all of the cleaned and shellacked surface.

Alternately apply coats of shellac and tissue paper until from 12 to 15 layers have been added. Then heat the jacket by placing it near a steam pipe or stove. The shellac will be softened by the heat at first, then harden as the alcohol is driven off. When fully hard the repair holds solidly and firmly in place.

In addition to the above methods of repair the editor has had experience with a number of other processes, all of which answered the purpose, and were applicable to various types of breaks.

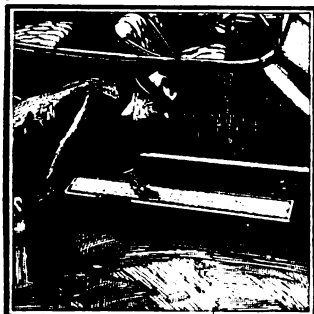
Very frequently the break is of such a type that no form of cement can be forced or drawn into it, in fact a crack may be so small as to be unnoticed under ordinary conditions, and become evident only when the water is under pressure. Such a break may be repaired by the following plating method:

Remove the block or part to be repaired and fill the jacket with a strong solution of copper-sulphate, made by dissolving copper-sulphate crystals (blue vitrol) in warm water. Turn the casting in such a way that the solution seeps through the break, being sure to catch the liquid in a glass or enamel ware dish as it comes through.

When all of the liquid has run through the break pour it back into the jacket again, and so on until the hole has been

Inter-State

You Want
Quality



You'll find real sheet aluminum running boards on the Inter-State. They wear better and keep the car looking bright and new. There are no "Make Shifts" used in Inter-State construction.

Dealers: You should sell this car of extra value. Write today.

\$950 to \$1025 Effective Dec. 1, 1917.

INTER-STATE MOTOR COMPANY
MUNCIE, INDIANA

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PREVENTS DUST
PRESERVES ROADS

Booklets on request

The *Smith* Company

New York, Chicago, Philadelphia, Boston, St. Louis, Cleveland, Cincinnati, Pittsburgh, Detroit, Birmingham, Kansas City, Minneapolis, Nashville, Salt Lake City, Seattle, Peoria.



Giant Searchlight

The highest quality lowest priced lamp produced

LIST PRICE With Mirror - \$5.00

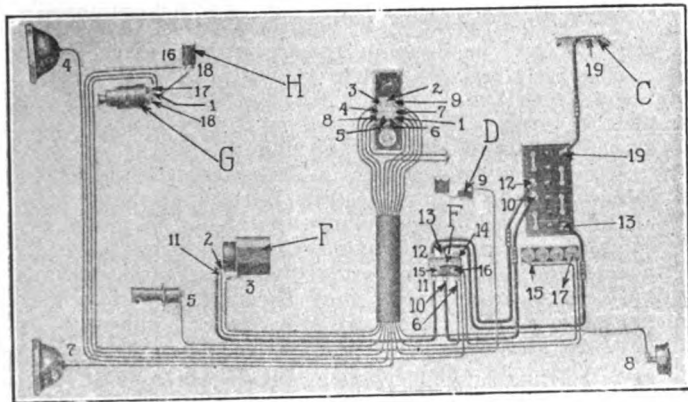
Without Mirror - \$3.00

Sold by all dealers

CULVER-STEARN'S MFG. CO.,

Worcester, Mass.
Detroit, Mich.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Maxwell Wiring Diagram: C, Frame; D, Regulator Shunt Contact; F (Right), Starter Switch; F (Left), Motor Generator; G, Magneto; H, Ignition Coil; Other Numbers Show Terminals and Are on Diagram to Enable One to Trace Wiring.

QUESTIONS ON MAXWELL CAR. (C. M., Williamsport, Pa.)

Will you please tell me how to remove the cylinder head of my Maxwell 25, 1916 car? When the car is climbing a hill on second speed I am obliged to hold the change gear lever in place or it will slip out. Can you tell me how to prevent this slipping? Will you please tell me where in the circuit I can connect a spot light. Where can I connect a dash light?

To remove the cylinder head, first drain all the water from the cooling system and disconnect the water hose leading from the top of the cylinder head to the radiator. Loosen the fan adjustment and remove the fan and fan belt from the engine. You may simply unfasten the belt and leave the fan assembly on the cylinder head if you wish, but there is danger of breakage. Tag the spark plug wires and disconnect them from the plugs.

There are 14 cap screws used to fasten the cylinder head to the block and when these are removed the cylinder head may be lifted from the engine, exposing the cylinders, valves, etc., from which you may scrape the carbon.

In replacing the cylinder head be sure to use a new gasket, the old one will not do. Coat it upon both sides with a paste made by mixing graphite and oil, or with orange shellac, though the graphite is preferable.

To get the best results you should follow a system in tightening the cylinder head cap screws. Put all of the screws in place and turn them down until they begin to bind on the cylinder head, but do not set them up with the wrench.

Turn the two screws at the ends down with the wrench, but be careful not to turn them way down. Next turn the two middle ones down an equal distance, then two on the sides and so on until all have been turned an equal amount. Follow the same order, turning each screw half a turn more until all have been fully tightened and set.

The idea of this procedure is to get all turned down an equal amount so that each cap screw bears the same amount of strain. In this way only can you get full satisfaction and good compression.

While the head is off the engine it will be a good plan to clean the valves, examine the valve guides for wear, grind the valves and tighten the connecting rods. All of this detail was taken up in our Maxwell overhauling story, published in the September 10th issue of the Automobile Journal.

The trouble which you have with the gearset is due to trouble in the change gear cover. Remove the change gear cover, upon which is mounted the change lever. The cover is held by four nuts on four studs.

The sliding gears are actuated by gear forks, which are mounted upon two shafts in the change gear cover. When the sliding shafts are slipped into place, meshing a particular set of gears, a spring plunger from the top drops into a depression in the shaft and holds the gear into mesh. After constant changing these depressions wear smooth, or the plungers on the ends of the springs lose their edge and the shafts slip backward very easily. A renewal of either the



CONSERVATION

Get the full output of your engine, develop its maximum power and don't contribute to the waste of gasoline.

Avoid inefficient, weak ignition systems which cause waste; Bosch Magneto Ignition is effective, reliable ignition.

Correspondence Invited.

BOSCH MAGNETO CO., 204 West 46th St., New York

Chicago

San Francisco

Detroit

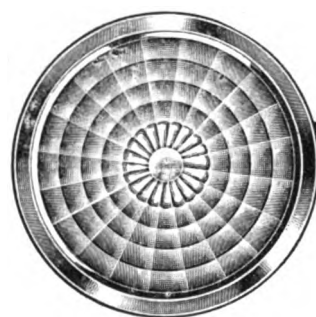
Service Stations in Every State

"MORE-LITE"

The Perfect Auto Light

100%
Efficiency

50%
Cost



Eliminates
the many
dangers
of night
driving

**Why Pay More for Less Light
Than Less for "More-Lite"?**

With "More-Lite" lenses your bright lights are within the laws of all states.

They are one-piece lenses. Made in either Crystal or Amber glass; in sizes to fit any car.

LIST PRICES

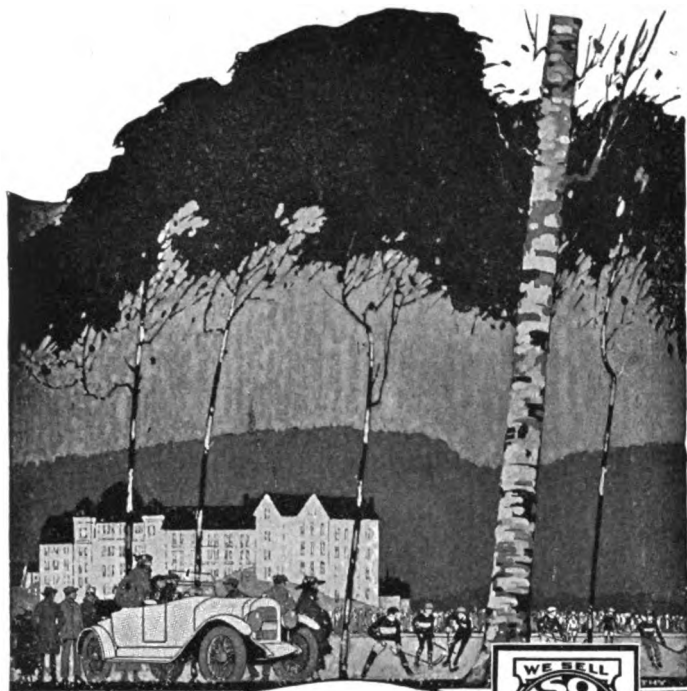
Diameter in Inches	Per Pair	Diameter in Inches	Per Pair
6" to 8 1/2" inclusive..	\$1.50	9 1/2" to 10 1/4" inclusive..	\$2.00
8 1/2" to 9 1/2" inclusive..	1.75	10 1/4" to 11 1/4" inclusive..	2.25

DEALERS AND JOBBERS WRITE FOR SPECIAL DISCOUNT

Manufactured by

L. E. Smith Glass Company, Mount Pleasant, Pa.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



No Day Too Cold for

POLARINE

The Standard Oil for All Motors

Polarine Oil gives mid-summer lubrication in mid-winter weather—maintains the same efficient film of oil between cylinder wall and piston. Heightens compression—lowers engine heat. Always high-grade—dependable.

And for quick starts, snappy pick-ups, no matter what the season, use SOCONY Gasoline. Pure, uniform, reliable.

Look for the Red, White and Blue SOCONY Sign.

STANDARD OIL CO of NEW YORK

(Principal Offices)

NEW YORK
BUFFALO

ALBANY
BOSTON

POLARINE

plungers or the shafts will stop the trouble.

The spring plungers are held in place by four small set screws located in the top of the change gear cover.

You are given two choices for dash light installation, the first in series with the tail light, is best because the dash light will act as a telltale and go out if the tail light fails; the second in parallel with the tail light.

To connect the dash light in series with the tail light, disconnect the wire leading from the tail light to the dash panel, at the panel, this wire is marked No. 2 on the accompanying diagram, and may be traced by switching on the tail and head lights and disconnecting the wires at the dash panel until one is found which, when disconnected, breaks the tail light circuit but not the head light circuit. Connect this wire with the dash light and the other dash light terminal with the terminal to which the tail light wire was originally fastened. A three-volt light should be substituted for the present six-volt tail lamp bulb and the same size bulb used in the dash.

For the second installation find the tail light terminal at the dash as above and connect this terminal with one terminal of the dash light. The other terminal of the dash light should then be grounded. Six-volt lights should be used in both tail and dash.

The spot light should be connected with the headlight circuit. Find the headlight terminal on the dash (either No. 4 or 7 on sketch) by disconnecting the terminals one at a time until one of the headlights goes out and connect this point with one terminal of the spot light. The other terminal of the spot light should be grounded.

TOO MUCH COMPRESSION.

(J. B. H., Newark, N. J.)

I own a Ford car, year 1913, and recently had it entirely overhauled, new pistons put in, leak proof rings and the cylinders rebored. The results are entirely satisfactory in every respect, with but one exception. The compression is excellent, but I find that I am obliged to pay particular attention to the oil in the base, for it is diluted by the escape of gasoline past the rings into the base. Is there any remedy for this trouble, or will I have to replace the oil every few hundred miles?

Your trouble can be traced directly to the low grade of fuel, which is practically kerosene oil. Under the old conditions, before you had the car overhauled, the pistons and rings were probably worn and allowed the escape of some compression. The old cars were designed with much higher compression than those of today and to utilize the present day fuel the compression of your engine should be lowered.

Of course it would be foolish to loosen the ring fit or allow the gas to pass the pistons, for then you would get oil leakage into the explosion chamber. The remedy for the trouble is in the head.

The present Ford cylinder head is fitted with deeper explosion chambers and should fit your 1913 engine block. You will find that your trouble will disappear with the substitution of a new cylinder head for the present one.

CHALMERS OVERHAUL.

(Continued from Page 38.)

moving the nuts the cover plate on the axle housing should be removed and a screw driver inserted from the back. By this means the bolt may be held from turning while the nuts are being backed off.

The two large retaining caps at each end of the differential are retained by cap screws and are next removed, permitting the lifting out of the differential assembly, together with bearings and adjustments.

Models 35A and 35B had a two pinion differential. The spider for these models was retained by cap screws, which were wired to the housing. Upon removal of these cap screws the pinion and differential gears may be taken out.

Model 35C was fitted with a three-pinion spider and this differential is disassembled by removing the cap screws, six in number, which fasten the two differential parts together.

The master or drive gears on all models are riveted to the differential housing. One should examine these rivets

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very carefully and replace them should the gear be loose on the housing.

The pinion gear is fitted with roller bearings and two adjustments, which are designed to prevent end play, as well as to enable one to adjust the gear with reference to the master gear. The adjusting collars are backed off, permitting the removal of the two bearings and the pinion gear.

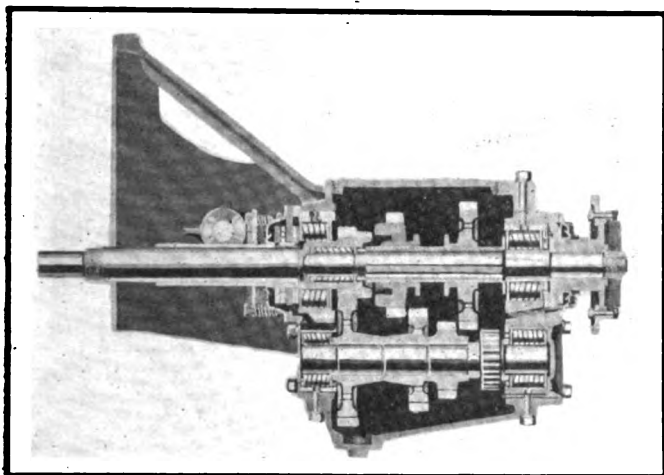
Adjusting Differential.

The whole unit should be assembled and adjusted before being replaced in the axle. To do this the pinion and master gears should be so adjusted that the backs of the gears come together in line, and the gear teeth bottom against each other. All adjustments should then be arranged so that there will be but slight end play in either the pinion gear or differential assembly. The pinion gear should then be backed away from the master gear about 1/64 of an inch, and the master gear backed away from the pinion an equal amount. A handle should then be fitted to the pinion gear shaft and the gear turned and proper adjustment made until the gears run together with little or no grind or friction.

Before putting the assembly into the axle housing be sure that there is a slight amount of end play in both the pinion gear and differential. Taper roller bearings if adjusted too tightly wear very rapidly, though even under tight adjustment there is little noticeable friction.

Steering Gear.

The steering gear is of the well known worm and worm



Cross Sectional View of Chalmers Transmission Gearset.

gear type and is fitted with two adjustments. This unit may be disassembled by removing the worm wheel cover and worm cover. Four adjustment points are provided in a worm wheel type of steering gear. Approximately only one-quarter of the teeth on the worm wheel are used in turning the car at right angles, so that under ordinary conditions but one-quarter of the teeth are worn at one time. As soon as one sector is worn the worm wheel should be turned a quarter revolution, and the steering arm changed to conform.

At the top of the Chalmers steering gear is an eccentric bushing, which is designed to carry the steering arm, upon which is mounted the worm, nearer to or farther away from the worm wheel. This bushing is kept in place by a set screw.

At the lower end of the steering column and beneath the steering gear housing is located a thrust bolt, which is designed to take all end play from the steering column.

Timing and Adjustments.

If the timing gears have been properly marked there will be no trouble in replacing them so that the timing of the camshaft will be correct. The flywheel is marked to show when the inlet valves should open, the marks being visible when the flywheel inspection hole cover is removed. To set the camshaft turn the flywheel over until the mark 1-6-IN-6 appears at the top of the circle. Then with the camshaft gear removed turned the camshaft in a counter clockwise direction until the inlet valve in number one cylinder just starts to open. This point may be determined by rocking

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MOTOR TRUCK

Times Building

Pawtucket, R. I.

the camshaft back and forth with one hand on the push rod. The timing gear should then be put into place and fastened, being careful to check the timing with one of the other marks on the flywheel.

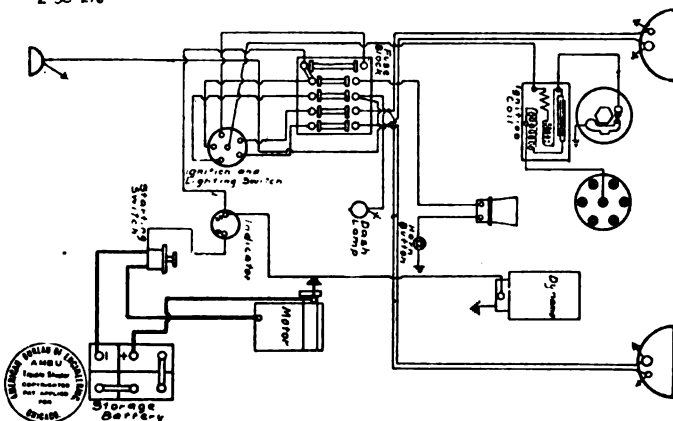
The ignition units of all models may be set after the gears have been meshed. Turn the engine over until the piston in number one cylinder has passed the top of its stroke, but has only just started on the down stroke. Retard the hand lever and remove the distributor cover, first having noted the position of number one spark plug terminal in the distributor head.

Remove the distributor brush and unlock the lock screw on the timer cam. Turn the cam until the breaker points begin to separate and it is possible to replace the distributor brush in position directly under the terminal leading to number one cylinder. Lock the cam and check the ignition with another cylinder. The firing order is 1, 4, 2, 6, 3, 5, and the distributor wires should be connected in this order. (No. one cylinder is next to the radiator.)

There are three points of adjustment on the models 35A and 35B carburetors. The first is marked "high speed," the second directly underneath the high speed, and the third on the intake side, directly back of the flange. The latter is termed the "low speed" adjustment.

Before starting the engine and with the throttle wide open turn the second adjustment toward the air horn until as the throttle is closed and opened the roller lever passes the economizer notch, directly below the adjustment, without lifting

WESTINGHOUSE Chalmers 1916 "35"
E 38-216



Wiring Diagram of Chalmers Car.

the high speed adjusting needle then back the adjustment three notches, giving the trial adjustment.

Start the engine and with the roller lever in the economizer notch, but not lifting the high speed valve, adjust the high speed nut for highest engine speed, being careful that the throttle does not move during the adjusting.

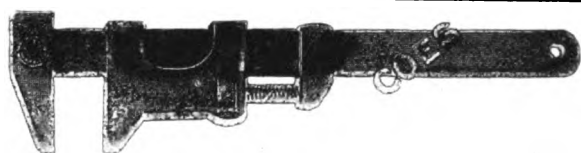
With the throttle closed adjust the low speed screw for smoothest idling at about 200 revolutions per minute. By quick acceleration and road tests the second adjustment may be altered to get the best results.

The carburetor on model 35C has practically the same adjustments, though the general design is not quite the same. To make the adjustments on this carburetor proceed as follows:

Set the choke valve on the dash to the lean position and turn the economizer adjustment to the extreme right or counter-clockwise. Next turn the high speed adjustment down until there is no play in the inverted T lever arrangement, and continue to turn until two complete turns and one notch have been made.

Then turn the economizer adjustment to the left so that there will be about 1/64 of an inch clearance between the high speed sleeve and the inverted T lever. (About the thickness of a business card.)

Turn the low speed adjusting screw located just beneath the manifold flange until it seats and then back one full turn. As above, this adjustment should be changed, at the high speed screw until engine runs smoothly.



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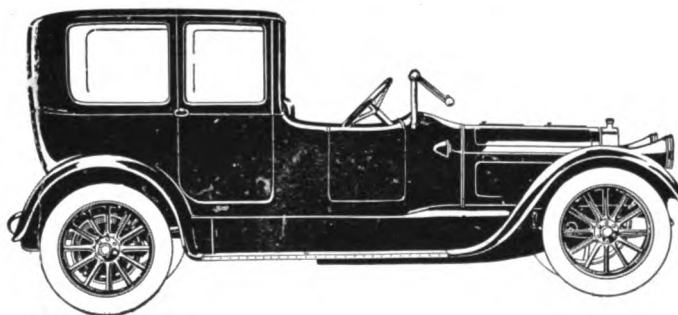
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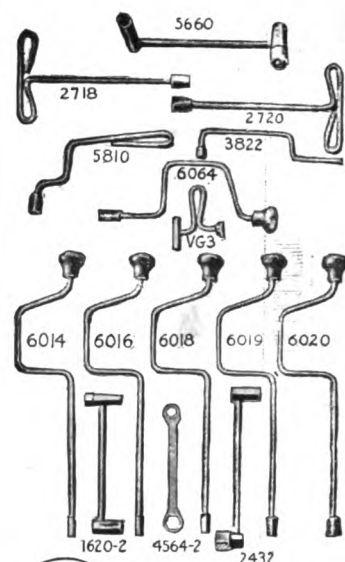
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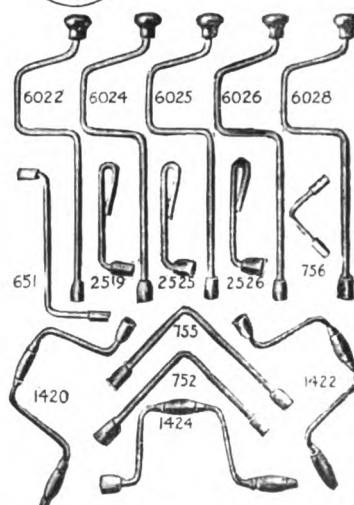
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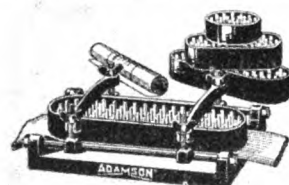
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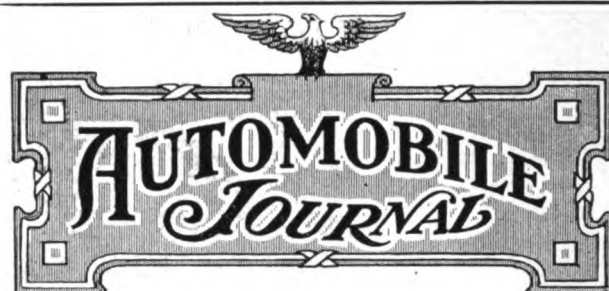
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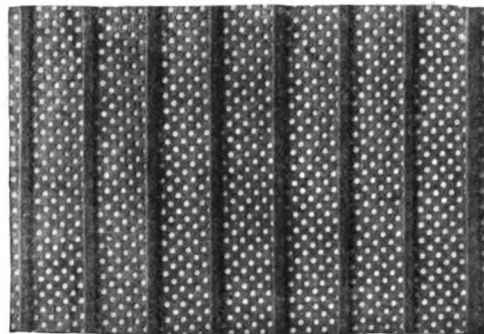
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31x4	.. 5.00 up	36x4 1/2	.. 8.00 up
32x2 1/2	.. 5.00 up	37x4 1/2	.. 8.00 up
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GREAT SLAUGHTER on Second Hand Auto and Truck Parts of all descriptions, including Magnetos, Carburetors, Starters, Head Lights, Radiators and everything pertaining to the automobile. Consult us first and save yourself time and trouble.

BOULEVARD MOTOR CO.,
276 River St., Cambridge, Mass.
Phone Cambridge, 1621.

AUTO PARTS—At Your Own Prices. We can supply parts for nearly every make of car. 648 Packards, Interstate Fours, also Truck parts, GMC and other makes.

Write us for Parts. We have them.

STRANDWAY AUTO PARTS CO.,
193-195 H. St., South Boston, Mass.

RADIATORS.

We repair Radiators in most any condition, also Lamps, Windshields and Fenders of every make and in any condition. Largest repair plant in New York. Great accessory bargains on hand for immediate delivery.

Write, Wire or Phone.

HUDSON AUTO LAMP WORKS.
1650 Broadway, New York City, N. Y.

AUTO PARTS

At Nearly Junk Prices.

We carry a stock of parts for the most popular cars up to 1915 models. All in good condition. Out of town orders given careful and prompt attention.

BEACON AUTO PARTS CO.,
469 Columbia St., Somerville, Mass.

TRADE OUTLET

DON'T MISS THIS

If you want to get some nice, fresh, pliable second tires at very low prices send us an order. Before opening this store we went direct to the factories and bought a large stock. Our large purchase and ready cash enabled us to get these tires at a much lower figure than the ordinary tire dealers get them. No old or shopworn tires in this stock. Every tire is good for a lot of mileage.

CAST YOUR EYES OVER THESE PRICES

30x3½ Firestone.....\$8.25
34x4½ Fisk.....\$18.50

We also have a large stock of the following makes: UNITED STATES, GOODRICH, BATAVIA, HOOD, ETC.

30x3	\$7.00	33x4	\$16.05	35x4½	\$23.10
30x3½	9.50	34x4	16.50	36x4½	23.30
32x3½	11.50	35x4	18.75	35x5	26.45
31x4	14.90	36x4	17.60	36x5	30.00
32x4	15.30	34x4½	21.80	37x5	28.50

Non-Skid 10% Extra

Mail Orders Given Prompt Attention.

GENERAL AUTO TIRE CO.

187 Columbus Ave., Boston.

Tel. Beach 7434.

USED TIRES

We have the largest stock of Used Tires in New England to select from. We can make immediate deliveries from 1 to 100 tires of each size. Our enormous output enables us to quote lowest prices.

COMPARE OUR PRICES.

28x3 ..	\$2.75 & up	36x4 ..	\$7.50 & up
30x3 ..	2.85 & up	33x4½ ..	8.00 & up
30x3½ ..	3.95 & up	34x4½ ..	8.00 & up
32x3½ ..	5.00 & up	35x4½ ..	8.00 & up
34x3½ ..	6.00 & up	36x4½ ..	8.00 & up
31x4 ..	5.00 & up	37x4½ ..	8.50 & up
32x4 ..	5.50 & up	35x5 ..	9.00 & up
33x4 ..	6.50 & up	36x5 ..	9.00 & up
34x4 ..	6.00 & up	37x5 ..	9.00 & up
35x4 ..	7.00 & up	38x5½ ..	12.50 & up

10% Extra for Non-Skid.

A 20% deposit required on all mail orders. Special prices quoted to dealers on dozen lots.

CAMBRIA TIRE EXCHANGE.

204 Columbus Ave.

Factory, 21 Cambria St.
Boston, Mass. Tel. Beach 7396.

CYLINDER REBORING

OVERSIZE

Pistons and Rings

Out of city orders given prompt and careful attention.

CORP BROS. 40 Mathewson St.
Providence, R. I.

Radiators—Fenders

Automobile repair work in all its branches. Doing the most satisfactory work. Skilled workmen, good materials, moderate charges. Radiators, Fenders, Hoods, Tanks, Boxes, Pans, Sheet Metal work. Insure your Radiator from freezing by using

PEERLESS ANTIFREEZE.

It prevents loss of use of car and loss of time resulting from laying up of car.

WALTER H. BROWN

18 Cambria St., Boston, Mass.

BIGGER PROFITS Fewer Troubles

If You Use

Superior

Parts and Brushes

for all ignition, starting and lighting systems.

"They Last Longer, but Cost Less."

Write for Catalogue.

SPECIALTY MANUFACTURING CO.,

635 Mass. Ave., Arlington, Mass.

Phone Arlington 99-M.



SMASH-UP. Tel. Beach 2013. Radiators repaired and rebuilt. Rush work a specialty. Special rates to Auto. Journal readers. Expert Auto Radiator Co., 214 Pleasant St., Boston, Mass.

CYLINDERS RE-BORED

All sizes. Oversize Pistons, Rings, Etc. Fords\$15.00
Croft Electric Lighting Outfits for Ford Cars. Agents Wanted.

THE AUTO EXCHANGE,

7 Reservoir Ave., Providence, R. I.

AUTO PARTS.

We carry a large and complete stock of Parts of every kind for all cars. Sell whole or in part. Also Alco Truck Motor, large 3-ton truck in running order at low price. Any parts for Pope-Hartfords. Will also pay spot cash for your old car in any condition. Write or Phone Camb. 2707. Cambridge Auto Parts Co., 220 Webster Ave., Cambridge, Mass.

Rebuilt Magnetos

High Tension Bosch, \$12.50 Up. Warranted to give perfect satisfaction or money refunded.

SPECIALTY MANUFACTURING CO.

635 Mass. Ave., Allington, Mass.

FOR SALE—Two 10-ton Model 10 Tractor Trucks with 8-yard Semi-Trailer Bodies.

A. G. O'BRIEN,

Railroad Ave. and Howard St.

Long Island City, N. Y.

Tel. Hunters Point, 1282.

MAGNETOS

All electrical apparatus bought, sold, repaired.

Get Our Prices.

HERBERT AUCOCK.

185 Columbus Ave., Boston, Mass.

Established in 1910.

ENGINE DRIVEN TIRE PUMP

This pump is made especially for Ford cars, is as efficient and simple in principle and construction as it is in operation; drive gear attached to crank shaft and no machine work or drilling required; our price, complete, \$2.65. BASCOM.

Special Price **\$2.65** Made to sell for \$8. Is complete with hose and pressure gauge.

\$3.00 Official Automobile

BLUE BOOKS \$1.50

Latest Edition Out. Sells for \$3 Each. New England Edition and at half the regular price, postpaid this week for \$1.50. A few left. BASCOM.

4 Guaranteed \$1.25 Spark Plugs for.....\$1.00

Demountable Rims for Fords \$

4 NEW WHEELS, 5 Rims, 1 Spare

SPECIAL PRICE THIS WEEK, \$13.50 AND YOUR OLD WHEELS

We trust you to ship us your old wheels, express paid, after you have changed them. Do not miss this bargain.

These wheels are guaranteed first quality.

30x3½ Guaranteed Tubes.....\$2.25

BASCOM'S,

222-228 Columbus Ave.,
BOSTON, MASS.

13.50

TRADE OUTLET

HARRY M. O'BRIEN
Tires and Auto Supplies
Practical Vulcanizing
245 Columbus Ave. Boston, Mass.

We now carry a full and complete stock of Auto Accessories and Tires.

We are prepared to quote Dealers lowest discounts for immediate delivery

U S USED TIRES

Our references should command your attention. Any Boston tire agency, Dunn's and Exchange Trust Co. Mgrs. K. S. Brayton, George Valley.

30x3 ...\$3.30	34x4 ... \$8.00
30x3½...\$4.50	34x4½... \$9.00
32x3½...\$4.85	35x4½... \$9.00
31x4 ...\$6.00	36x4½... \$9.00
32x4 ...\$6.00	35x5 ...\$12.00
33x4 ...\$7.00	37x5 ... \$10.00

NON-SKIDS 10% HIGHER.

USED TIRE OUTLET CO.

191 Cambria St., Boston, Mass.

Brooks-Skinner Co., Inc.
 QUINCY POINT, MASS.

Send
for
Cata-
log J



Largest Manufacturer of Portable and Steel Garages in the Eastern States. Catalog J and Prices on Request.

TIRE DEALERS

STOCK UP.

Write or Phone.

Tire Outlet Co. Inc.

211 Columbus Ave., Boston, Mass.
 Phone Back Bay 2821.

GLOBE VULCANIZING CEMENT.

Best in the world. Heavy, \$2.00; medium, \$1.75; light, \$1.50, in gallon cans; 15 cents gallon less in 5 and 10-gallon cans. Manufactured and guaranteed by
HENRY E. EBY, JR.
 Fernwood, Delaware Co., Pa.

21 Used Trucks AT BIG DISCOUNTS

9 one-ton Ford Maxter Trucks, with furniture, express and platform bodies, all 1917 models, sold on new car guarantee. While they last..\$500 each

3 brand new one-ton Maxter attachments to fit a Ford. Never been used. Will give \$125 discount off regular price.

3 1916 Vim Trucks, express, furniture and panel bodies. A quick selling price\$350

1 ¾-ton Stewart, with Continental motor and Timken rear end, with express body. A good trade.

1¾-ton 1917 Stewart. Panel body. Price\$350

1 1916 Selden, worm drive, has original tires. Used very little, Condition guaranteed. Chassis cost \$1875. My price, \$750 cash. Why buy a new truck?

3 Ford deliveries. All styles of bodies.

Two Carloads of Bodies

All styles. Get my prices before buying. Big discounts. Anything you want for your Truck or Automobile. Write me. I can save you money.

J. Edward Gallagher,
 12 Marshall St. Somerville, Mass.

GEARS

FOR TRANSMISSIONS AND DIFFERENTIALS

Write Our Sales Department About Your Requirements.

SERVICE GEAR & MACHINE CO.
 Reading Pennsylvania

Auto Owners Why Overpay?

Send for our price list on guaranteed tires.

MAX LIBEN & CO.
 205J W. 48th St., New York City.

BOSCH Splittdorf, Eisemann

And all other makes of Magneto repaired right.

Guaranteed Ignition Outfits \$10. up

**The
Magneto Shop**

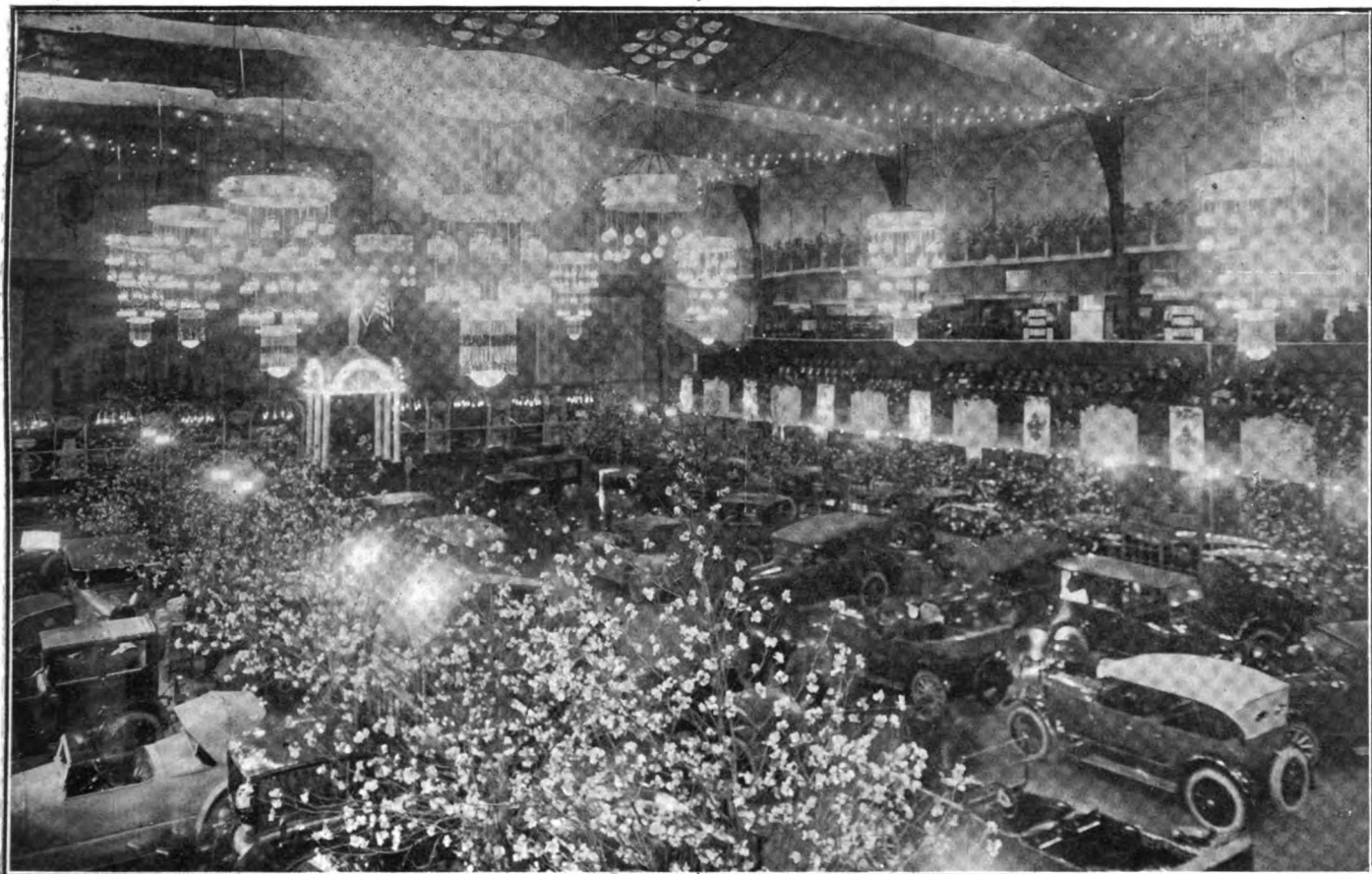
JOHN BRUNSWICK.
 187 Massachusetts Ave., Boston, Mass.

The AUTOMOBILE JOURNAL

VOL. LXV.

PAWTUCKET, R. I., MARCH 10, 1918.

NO. 3.



Boston's Big Brilliant Bustling Show

THE Boston Automobile Show, which is in reality New England's show, and, incidentally, the largest exposition of the products of the motor car industry and allied lines held anywhere in the world, was successful to a point that exceeded the most optimistic expectations of both the dealers and exhibitors who participated, as well as the management.

This being the first Boston show held while the country was at war and more or less unsettled conditions in the industry led to a certain timidity at first in basing predictions on the outcome, but before the week was half over a general spirit of optimism spread throughout the big building and by Saturday, the closing day, it was generally known that attendance records were broken and that probably in business transacted a new high level was reached and this in it-

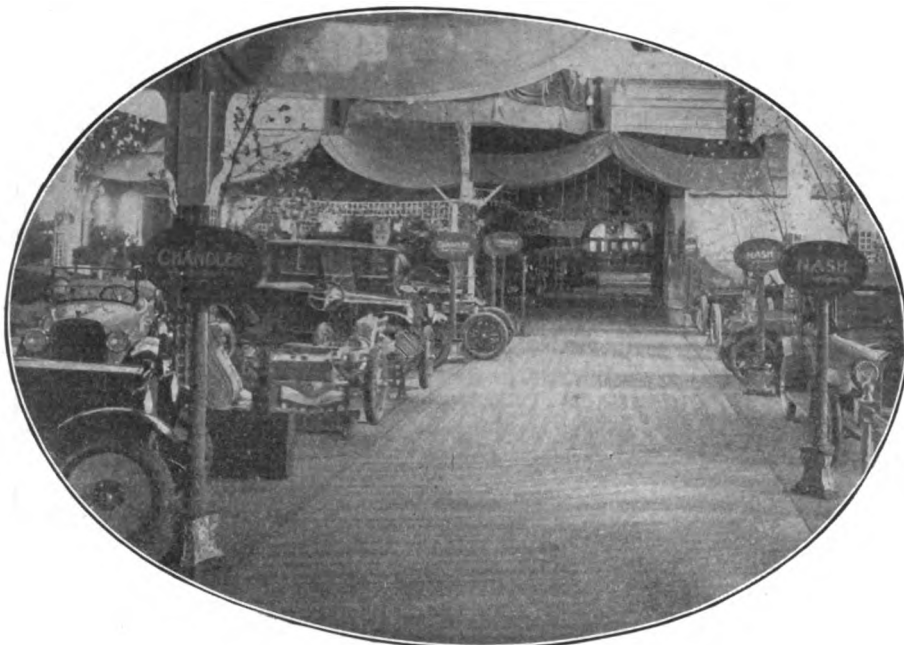
self reveals the magnitude of the exhibition, as last year some \$4,000,000 worth of products were disposed of during show week.

The size of the show and the excellence and variety of exhibits was really of secondary consideration this year as compared with the outcome of the show in regards to patronage and business accomplished, as the motor industry, as well as the trade in New England, were watching eagerly to feel the pulse of the public as to its attitude toward the motor car. The public responded in a manner to set at rest all doubts as to their intentions or attitude, convincing proof being shown that there is a demand in New England for motor cars, trucks and accessories that would have more than absorbed production even if there had been no curtailment in the output of cars.

Dealers, while they will have a smaller number of cars to handle, will have a sufficient number to make their business profitable and they feel optimistic, as the cost of selling will be less on account of the demand and the trade in problem will no longer be a bugaboo, as the used car will be as salable as a new one, and at a figure that will eliminate much of the risk of loss.

An idea of the magnitude of the exposition is given in the number of exhibitors, which totaled 364. There were 80 different makes of automobiles, 60 makes of trucks and 222 accessory products exhibited. Over 460 cars, trucks and chassis were on display in the building during the week.

Many dealers reported that they were surprised in the number of sales to new buyers. These purchasers were mostly people of the working class, who are en-



The Distinctive Contrast Between the New Type Disc Wheel and the Old Artillery Type Is Shown in Many Instances.

joying the high wages that have come with prosperity throughout New England in the various manufacturing lines. Many such buyers appeared at the show and they included men who while heretofore making a comfortable living and laying aside a nest egg for the rainy day, did not feel that they could afford an automobile. This year, however, their increased earnings have provided a surplus from which they are enabled to buy a car and increase their efficiency, as well as maintain their health.

That this favorable condition is general throughout the six New England states was also borne out by the spirit of optimism among the many dealers from throughout the territory that attended, some 7000 in number. New England is one of the most densely populated, as well as wealthiest sections in the world, and its suburban development has been phenomenal in the past few years, due largely to the use of the automobile, which makes it possible for a man to live away from either railroad or street railway lines and yet go daily to business in the cities.

Appealing to the eye, the most conspicuous feature of the show was the large number of cars equipped with the disc wheel, which is made of pressed steel and is similar in construction and appearance to those which have been used in the theatre of war for the past two years. This wheel was adopted in England and France, as it proved stronger and more serviceable in war work where a machine is constantly exposed to the elements, as well as rifle bullets or shrapnel. It does not become loose through shrinkage and expansion and is easily kept clean, points of advantage which have been responsible for its adoption by passenger car manufacturers. Among the models at the show equipped with disc wheels were a Cadillac, Daniels and Hudson, and these cars in addition to having a very distinctive

appearance gave the exhibits a war atmosphere.

A distinctive military feature was not lacking and it was in accordance with the spirit of utilitarianism that characterized the show throughout. About 250 men from Camp Devens, members of the 301st U. S. A. Supply Train, in command of Lieut. W. D. June, marched to the show as an escort for Governor McCall of Massachusetts on Thursday afternoon. While the men paraded from the State House to the Mechanics building, headed by a military band, the occasion was more than ceremonial, as after the soldiers had reached the hall they were instructed to employ their time in inspecting the various machines, trucks, devices and accessories to gain information that would be of practical use to them when in service in France.

When the men arrived in Boston from camp they were met by C. S. Henshaw of

the Boston Automobile Dealers' Association, who had enough automobiles in waiting to carry the entire troop to the State House, and when they arrived at the show with the Governor they were met by a committee of the association and its president, J. H. MacAlman. All the exhibitors and their salesmen were prepared to receive and assist the soldiers in their round of inspection.

The new "little" Overland, which was shown for the first time in New England, was on exhibition at the space of the Connell & McKone Co., Boston Overland distributors. The chassis and body were displayed separately and were constantly the centre of attention by as many people as could crowd about the railing surrounding it and still obtain a view. This latest entry into the low priced field has attracted widespread attention at the show, as it also did in the New York and Chicago shows on account of its unique spring suspension, as well as the fact that it will sell at a low price. The price has not been definitely announced, although it is understood that it will be in the neighborhood of \$500. The wheelbase is only 100 inches, yet the new three-point cantilever spring suspension gives it the same suspension effect as a car of 130-inch wheelbase.

This new cantilever suspension acts on the lever principle, transmitting the throw to the opposite end of the car from that of the springs. Each spring, it is claimed, must lift the whole body of the car in order to cause rebound, and as this is said to be impossible, the result is, the makers claim, that the shock and rebound are restricted to the wheels. Its short turning radius is another point of advantage claimed, as it can be easily handled in crowded traffic or on narrow roadways.

The equipment on the new car will include an electric starter, generator, horn, lights and other standard accessories.

Another new car at the show was the "Holmes," which has an air-cooled engine. It is manufactured by the Holmes Automobile Co., Canton, O., of which Ar-

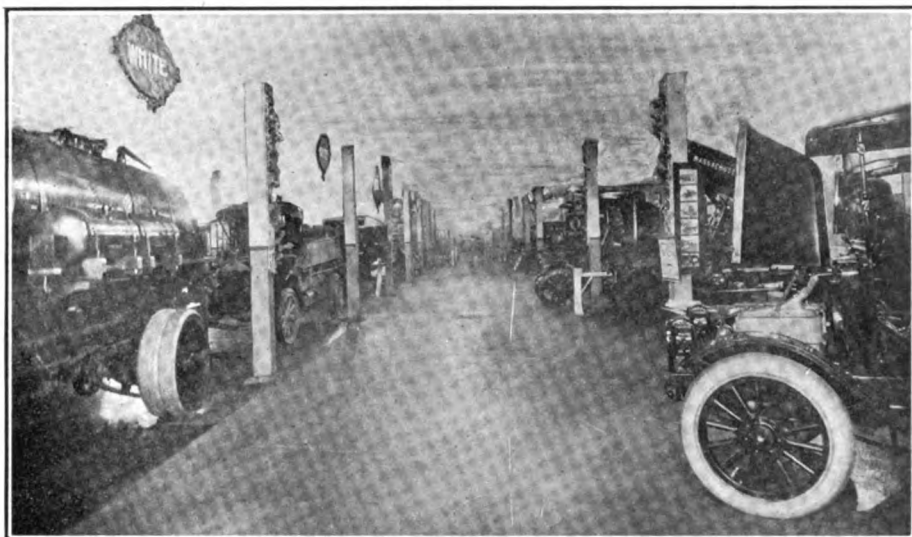


View Down an Aisle in the Big Accessories Exhibition, Showing Extensive Display at Left of Joseph Dixon Crucible Co., Lubricants.

thur Holmes is president, and was shown by George W. Canterbury, Inc., the Boston distributors. This car was the centre of a crowd every afternoon and evening throughout the week. The Holmes company has a factory with 175,000 feet of floor space and plans the manufacture of over 3000 cars this season.

In past years the Locomobile Company of America has seldom exhibited a chassis at its exhibition in the big shows, as the luxurious coach work has always been a feature on the Locomobile models. This year, however, as it is believed that there was a question in the public mind as to the maintenance of quality in construction the company exhibited a chassis, showing the high standards of material and workmanship employed, as well as the improvements which have been incorporated. This chassis, which is styled "series two," has a new tandem system of ignition, through which not only an increase in power is obtained, but "piston slap" is eliminated. The Berling magneto, which is used, was adopted after exhaustive tests lasting over a year. The same high quality metals are used throughout in the Locomobile construction this year, and in the base of the engine government specification bronze has been adopted. A vibration damper and a newly designed dry plate clutch, which operates noiselessly and has discs of increased size and requires no lubrication, are other new features on the chassis. There are between 5000 and 6000 parts in the Locomobile chassis, which require some 150,000 operations to complete, many of which are performed by hand.

There were numerous gatherings of dealers and "get-together" meetings during the week at which the speakers expressed extremely optimistic views as to the outlook from both a patriotic as well as business standpoint. The thought in this respect was followed up by the deed which is substantial evidence that the dealers have the courage of their convictions that the year will be a bountiful one. Many large deals were consummated during show week, as in years



The Utility of the Motor Car Was No Where So Strongly Expressed As in the Basement, Where the Long Lines of Trucks Stood As Silent Sentinels of Service.

past, and a large number of dealers who formerly confined their efforts solely to distributing passenger cars took on lines of trucks or truck making units.

The big truck exhibit at the show, the largest and most comprehensive ever held of commercial vehicles, is an incentive to the expansion of the dealers' province and this year more than ever before the truck loomed up as a logical business proposition to take up the lost motion resulting in the dealer organization from the curtailment in passenger cars and turn it to a profit.

John L. Judd, distributor of the Allen and Auburn cars, who also handled the Smith Form-A-Truck in New England, added the Gramm-Bernstein to his line.

Another one of the big deals of the week was that completed by A. H. Sowers, manager of the Jackson Motor Car Co. of New England, who announced that he had contracted for the entire output of the Amesbury unit made at Amesbury, Mass., by the Amesbury Body Co.

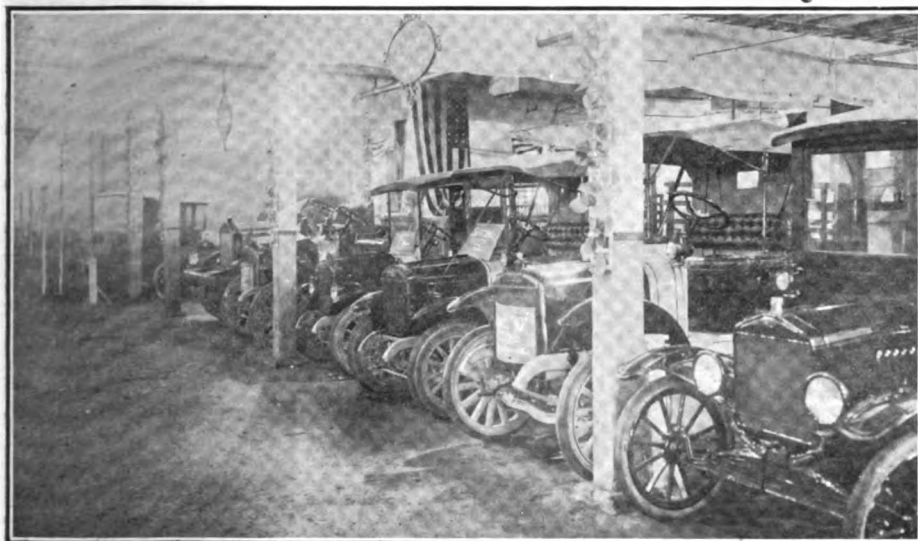
Every type of modern vehicle for commercial purposes was represented in the

display, including the light half ton job to the heavy duty machines with dump bodies. The latest thing in motor fire apparatus and war ambulances were also shown. A strong interest was manifested in the truck units, of which there was a large display, and the comment was general that this year would witness an even more extensive use of these devices for making commercial vehicles from passenger car chassis than in the past, as it would be necessary to meet the demand for haulage purposes.

With the government orders engrossing the attention of many truck manufacturers and the difficulty of getting cars to ship trucks for domestic business purposes, truck dealers feel that the unfilled demand will have to be met through the use of these truck units and that this was a conviction with many was shown by the fact that many dealers already having a line of trucks also have taken on a truck unit line.

The trailer also enjoyed greater popularity than at any previous show and a number of dealers have added this valuable vehicle to their lines of trucks and passenger cars. In the past year the demand for haulage to relieve the congestion in cities and interurban traffic has been so great that every means of increasing the capacity of a power vehicle is being adopted and the trailer in most cases can double the carrying capacity of a truck. The use of the trailer, however, is not restricted to use in connection with a truck alone, but is manufactured in types that can be used to excellent advantage with passenger cars.

In the accessories department exhibitors found the attention of the public, as well as the interest of the dealers, more enthusiastic than ever. This increased activity in accessories indicates a busy season and bears out earlier predictions that with over 5,000,000 cars in use and use of cars for longer periods than has been the custom in the past, owing to the short supply this year, there will necessarily be an enormous demand for parts, accessories and supplies to renovate and repair the cars now in use.



A Truck to Meet the Various Needs of Business and Commerce Were Found Lined Abreast with Special and Stock Bodies for Bulk or Variety Loads.

Expressions of Optimism During Boston Show

Dealers See Many Opportunities In The Coming Season and Predict the Greatest Prosperity In Country's History

Never before at any automobile show in the country where there were so many unrestricted expressions of confidence and optimism as marked the various trade gatherings, meetings and dinners held in Boston during show week. Pioneers in the trade and industry who have been successful in their business sounded a note of progress and patriotism with emphasis on the outlook for business throughout the New England territory. Distributors and dealers show the courage of these convictions in the way they are expanding their organizations and taking on additional lines.

Earning More Necessary Than Saving

President J. H. MacAlman of the Boston Automobile Dealers' Association gave a stirring patriotic and optimistic talk on the situation in its relation to the show and business in general. He said:

"America is going to win this war. Her financial resources are the greatest of any nation in the world. Instead of having a depressing effect on business and industry, the war has been an impetus. It has brought into being manufactories heretofore unheard of, doubled the output of others, and turned loose the great stores of wealth at Washington.

"The annual automobile show in Boston which has long been looked upon by bankers, financiers and manufacturers as a pulse of general business conditions and as a barometer of what is to be expected in the way of prosperity or depression for the rest of the year, sent a thrill through the business world when it was learned that it had scored instantaneous success.

"Business is not as usual. Unusual needs are being met. Some products have been modified to certain extent and emphasis has been transferred to other lines. The man who sits back and takes things as they come is apt to find himself hopelessly in the rear, with the advance guard made up of men who are more efficiently meeting new problems and conditions.

"It is a case of earning and producing—not saving. That earning is more necessary than saving in the maintenance of national wealth is indicated by the statistics of saving. Individual deposits in banks of the United States for the three fiscal years ending June 30, 1907—years of great earnings and free spending—show a net gain of more than \$3,000,000,000, while the following year—a year of small earnings and rigid economy—showed a net decrease of individual deposits amounting to more than \$300,000,000.

"The United States is the 'Verdum' of allied finance, the last great bulwark of the civilized line of defense. Europe depends upon us. Underneath our vast credit operations we must continue to build up our great fortress of sound investments.

"At no time in recent history of New England have conditions been so charged with rock-bottom opportunities for investments. Farmers last year had crops and abnormal prices, and artisans with full employment for every adult member of the family are receiving the highest wages in the nation's history.

"As the list of so-called 'non-essentials' drawn up by the priority board at the outbreak of the war, it was found after a careful study of these various industries that such a discrimination would be impracticable. It was found that there are almost no 'non-essentials.' All the industries were so strongly interwoven that to put any appreciable number out of business would be like throwing sand into the cogs of the whole industrial machine.

"For the past year business has been gathering momentum. The Boston Automobile Show for 1918 has released the throttle and from present indications New England will set the pace for the greatest single year of prosperity the United States has ever seen."

J. L. Judd Optimistic

"The show that closes tonight has been the most successful one I was ever in," stated John L. Judd during the week.

"Throughout the week my salesmen have been busy taking orders and have had dealers here from all parts of New England clamoring for cars and trucks on early delivery.

"Smith Form-a-Tractor certainly made a decided hit at the show and the orders secured were far in advance of my expectations. There was hardly a town or village in New England but what was represented at the show and all were interested in this type of motor vehicle that is doing so much to help Uncle Sam's transportations.

"The Boston Chamber of Commerce has taken up the question of length regarding shipments as applied to retail houses and at a meeting held not so very long ago plans were prepared for handling shipments by motor trucks in which 32 of the largest retail houses participate. This is only one of many steps to be taken by the Boston organization, for it is to be carried forward by the wholesalers in the handling of scores of products, including produce, meats, hides, wool, cotton and even grain as a method of relieving railroad congestion and increasing the supply to New England and

to the seaboard.

"In its latest bulletin to members the Boston Chamber of Commerce says: "Serious consideration is being given to the possibilities of motor truck transportation for freight shipments between Boston and other large New England centres, such as Providence, Worcester, Lowell and Portland, in order to relieve the prevailing freight congestion on the railroads.

"That such lines will be established seems assured if transportation for approximately 500 commodities classified as non-essentials is prohibited by the government as recommended by the Railroad War Board last month."

"Sell the Industry"

At the Maxwell-Chalmers dinner during show week, T. J. Toner, director of sales, spoke on "Selling the Motor Industry to the People."

"For a number of years past, and more especially now, at the dawn of a new year teeming with industrial problems of international magnitude, I have felt and do believe that, in justice to their predecessors and themselves, and in all fairness to the 4,000,000 citizens directly looking to them for daily sustenance, it is the duty and serious obligation of the men in command of the motor world to 'sell' this great industrial institution to the American people for whom it lives," he said.

"The word 'sell' can have but one meaning in this connection. I do not mean the financial sales of any one, particularly of the 550 automobile and truck builders. I do not look to the increased revenue of our own or any of the many competitive factories, nor do I mean anything but solely the establishment of the value of this unappreciated and comparatively unknown industry in the eyes of the American public.

"It is common knowledge, even to the boy in the grammar school, that the railroads are our leading and greatest industry. But I have found it shocking to many a college graduate to inform him that the automobile industry ranks third. And equally surprising is the same information to the average man.

"This comparative statement means that while the great railroad structure has been expanding through some 80 years or more, the automobile world in about one fifth the elapsed time has outstripped every American industry save steel and the railroads.

"The wages paid to the employees of the automobile and its allied industries total \$748,000,000 per year. This includes: 550 automobile factories, 1080 accessory plants, 2800 distributors, 25,000 dealers, 25,000 garages and 13,500 repair shops.

Liberty Engine a Packard Product

Emlen S. Hare Head of New York Branch Makes Sensational Announcement in Address

Emlen S. Hare, president of the Packard Motor Co. of New York, in speaking at the monthly dinner of the Sphinx Club in New York, made the sensational announcement that the Liberty Motor, which the government has adopted for its great fleet of airplanes, is a product of the Packard Motor Car Co. of Detroit, Mich.

Mr. Hare was speaking on "Successful Business Is Our Best Weapon to Win This War," and evidently had not intended to make the announcement concerning the origin of the Liberty engine, as his speech as given to the reporters did not include the announcement, which was on a separate sheet of paper.

"I am now at liberty," he said, "to mention one instance—and there are many—showing the unselfishness of business where the best interests of our government are at stake. The Liberty aviation motor is the outcome of three years of Packard work and some half million Packard money, and yet we withdrew our name from this motor and, with all designs, gave it over to our government because they felt this would be best for the furtherance of their war plans.

"You men who understand the value of advertising know just how great this sacrifice was. You can readily imagine what it would have meant to us if the most successful aviation motor was blazoned all over this country and Europe as a Packard 'Twin-Six.'"

Mr. Hare said that at the time the Liberty motor was taken over by the government an agreement existed between the company and E. A. Dees, then chairman of the Air Craft Production Board, to the effect that the identity of the inventor or producer of the motor should not be revealed.

Permission to make the announcement at this time was given by Howard Coffin, chairman of the Council of National Defense, Washington.

In speaking of the progress made at the Packard plant, Mr. Hare said:

"Because considerable tooling and special machinery is needed for quantity production of aircraft motors, there is a limit to the number of men we can use at present in that department. However, we have quite as many men employed there as can be profitably used. Further, these men have been drawn from our passenger car department, and just as rapidly as we can profitably use more men on aircraft motors these men are in turn drawn from our passenger car department."

The Packard's executive said that by taking men and machinery from the passenger car department for the company's airplane department it had already been necessary to decrease the output of automobiles. Further decrease

in the production of pleasure cars was forecast by Mr. Hare, who added that "it may even be impossible to build any automobiles."

BEARINGS SERVICE COMPANY TO MOVE TO LARGER QUARTERS.

The Bearings Service Co., general headquarters at Detroit, will soon move into new and larger offices. This building is located at the corner of Cass and Willis avenues, in the heart of the new automobile service section. The Detroit service branch of the company will occupy quarters on the ground floor. The entire second floor will be for the exclusive use of the general offices.

Although this is a young company, dating its start in September, 1916, its history has been one of truly remarkable development month by month. In September, 1916, just 16 months ago, the organization consisted of general headquarters and nine branch service stations. Today there are in over 275 of the most important automobile centres in America either a branch service station or an authorized agency of the Bearings Service Co., and it is planned to increase this number to over 500 in the next few months.

"The reason for this unusual growth," said Mr. R. S. Lane, president of the company, "is found in the extraordinary promptness and reliability of the service we render. Having been appointed official national service representative by the manufacturers of Timken, Hyatt and New Departure bearings, we were furnished by these manufacturers with engineering records and data that enable us to supply exactly the correct bearing part for any make of motor car, motor truck or tractor in which these bearings were ever installed. These records, together with the complete stocks of bearings kept in every branch, enable us obviously to give service that is not only exact, but prompt. It is only natural to expect that motorists will appreciate service of this kind and in their appreciation we find the reason for the great development of the Bearings Service Co."

AUTO. RACING IS RESTORED.

The Contest Board of the American Automobile Association has decided to resume its control of motor racing competitions for the season of 1918. It was agreed to rescind its discontinuation order of last November and to conduct the sport on a larger and more elaborate scale than ever before.

An almost universal request from motorists for the resumption of speed contests had its effect. Another element which promoted the A. A. A. to lift the ban was the hearty approval expressed

by the high government officials, including the nation's chief executive, for the continuation of all sport competitions during the war. Several of the European champion drivers have signified their intention of coming over in quest of the big prize moneys, which will serve to enliven the contests.

Three dates for speed carnivals have tentatively been assigned to the Sheepshead Bay Speedway, these being May 30 (Memorial Day), Aug. 18 and Sept. 21. The two meets decided at this course late last summer drew more than 125,000 enthusiasts to the seaside track.

U. S. Rubber Buys The Old Alco Plant

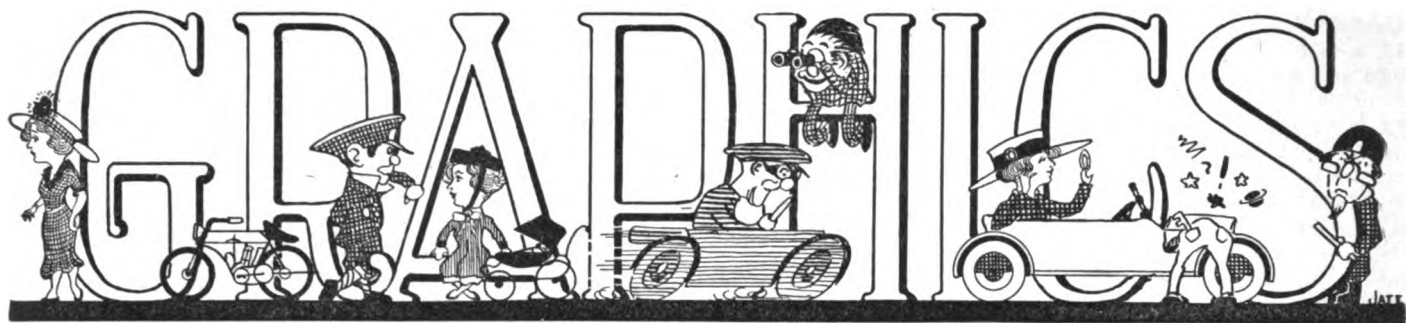
Several Buildings With Floor Area of
254,848 Feet Will Be Used for
Making Tires.

The United States Rubber Co. has purchased the plant of the American Locomobile Co. on Valley street, in Providence, R. I., where the Alco car was manufactured up to within several years ago, and will immediately begin the installation of equipment in the principal buildings for the manufacture of tires. Another large structure will be utilized for the making of balloons for the United States Army.

Col. Samuel P. Colt, president of the company, says that the purchase price was "somewhat under \$500,000." The property is one of the biggest manufacturing establishments in the state, and is taxed for \$371,220. Plans for the utilization of the plant by its new owners called for the earliest possible operation of the entire property. At least 3000 hands will be employed and the number may run as high as 5000. The property was purchased to meet the imperative needs of the United States Rubber Co. for largely increased facilities. The company's business has been expanded greatly by the war and could not be handled in the plants already in operation. The property runs through from Valley street on the north to the Woonasquatucket river on the south, and extends east to Hemlock street. The land has an area of 444,854 square feet, or slightly more than 10 acres, and the floor space contained in the building amounts to 245,848 feet. There are several large structures on the property, the main building being a three-story brick affair, measuring 63x493 feet. The property is served with a siding from the main line of the New Haven railroad.

In addition it adjoins the property of the Revere Rubber Co. on Valley street, which is already owned by the United States Rubber Co.

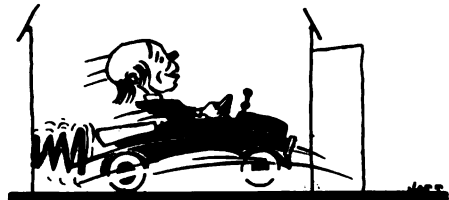
Solid and pneumatic tires will be made at the new plant, and while tires will be the principal output of the establishment, army balloons will also be manufactured according to present plans.



Irwin Millard, a chauffeur of Winstead, Conn., entered his car one night recently and started to drive down the main thoroughfare when he heard the clatter of horse's hoofs close behind. Thinking it might have been a traffic cop on horseback he increased his speed, but noticing from the sound that the horse likewise accelerated its pace, he stopped his machine and looked behind, discovering that a thoroughly alive, but much frightened horse with buggy attached was hitched to his machine, trailer fashion. Upon investigating the queer situation he learned that an unsophisticated farmer had driven into town and finding no better hitching post had tied his steed to the back of the car, apparently thinking that the owner had parked the machine for the night.

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A budding genius in the West being without funds to purchase the many devices for making his motor start accord-



ing to Hoyle on cold mornings devised a series of springs on a wooden bar at the rear of the shed where he housed his car. When putting the car in at night he backed it up against the bar, compressing the springs. In the morning when he released the brakes the car was impelled through the door, hitting on all four cylinders. We vouch for the practicability of this method only in so far as we can trust a country correspondent, but would suggest as an equally good plan for securing the same results that the garage be built at the top of a hill with a sloping floor. The motorist would then only have to release his brakes and let the law of gravity take its course.

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The part which New York City bears to the remainder of the state from a motor vehicle standpoint is shown in a report just issued giving motor vehicle registration by counties for the past year, classified by passenger, commercial and other types of cars, chauffeurs, receipts, etc. Of the 411,567 cars registered last year, 125,101, or about 30 per cent., are operated and registered from the five boroughs of New York City.



The report shows 93,655 passenger cars in the metropolis, 4437 omnibuses, 25,078 commercials, 299 trailers, 712 dealers and 920 cars exempt from registration fees.

The registration of these 125,000 cars brought in a revenue of \$1,324,416.50. New York City has 74,493 chauffeurs out of a total in the state of 133,686. In licensing its chauffeurs New York City contributed \$214,929. Fees from operators licensed last year foot to \$72,874, while miscellaneous fees from New York City alone amounted to \$62,055.75.

New York City received the past year the sum of \$800,266.08, the money going into the city's general fund. In addition to all this there were registered 7825 motorcycles in New York City, and as a result \$9907.94 reverted back to the city. In the total receipts of the state's motor vehicle bureau, amounting to \$4284.14, New York City paid \$1,694,113.25.

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With the return of spring the city streets and highways will again be dotted with long lines of motor cars with their alluring appeal to the automobile thief. Police departments throughout the country have been busy in the past year devising ways and means of coping with this criminal practise, which has increased at an alarming rate during the past two seasons. It is being generally conceded that the enforcement of the laws and the imposing of penalties will not solve the thief problem, but that the remedy lies in the hands of the owners, who must provide locking devices for their machines, as well as be more careful in leaving tires, spare parts, robes and tools about in their cars where they can be easily picked up by a thief.



Like the farmer who upon first viewing the giraffe at the zoo, said: "You can't fool me, there ain't any sich animal," the people of Nantucket, an island laying off the Massachusetts coast south of Cape Cod, have adopted the slogan of "We don't want autos and we won't have 'em," as a logical and final argument in opposing the bill now before the Bay State Legislature permitting the use of motor cars in their little kingdom. The railway on the island which furnished the only means of transportation outside of horse drawn vehicles, has been discontinued.

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In many of the country sections where the roads are of natural clay or sand, the deep frost that penetrated the ground during the past winter has produced a condition of slough and mud that makes them practically impassable. This condition in these sections will obtain for many weeks to come unless a protracted



spell of dry warm weather is experienced to dry up the road beds.

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The slogan of efficiency is put into practical operation by the Champion Spark Plug Co., which took out 65 memberships in the Y. M. C. A. for members of its sales force. The men are given an all around training in athletics and later, after they have become proficient, an indoor meet will be held in which all the salesmen are expected to compete.

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The records in the automobile office at the Massachusetts State House show that today over 80,000 motor vehicles are in use in this state, 60,000 of them passenger cars and 20,000 commercial vehicles.

During January the registrations of passenger cars in Massachusetts were at the rate of more than 1000 cars a week and during the very coldest week, when the temperature dropped far below zero throughout Massachusetts, there were registered 1100 cars. Commercial motor car registrations in the same part of the winter have averaged about 200 a week.

California registered 306,247 cars in 1917, a gain over 1916 of approximately 70,000, or 31 per cent. This is the largest increase in registrations in the history of the state motor vehicle department. Los Angeles leads all counties in the state with a gain of 21,327 and now has practically 97,000 registered cars within its precincts. This is more cars than were in 33 states of the Union according to reports last July.

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During the past week at Boston's big automobile show there were hundreds of cars on exhibition of the very latest design and finish, but it is doubtful if any of them attracted the attention drawn by a single-cylinder Packard of 1901 when it "chugged" along through the city to the Mechanics' building. It was one of the first cars ever turned out at the Packard factory in Detroit and is still in good operating order. While it will not burn the surface off a modern macadamized road and would never do to lull the baby to sleep with, it will keep going and does not balk at many hills. Its appearance on the streets among the modern automobiles brought out vividly the great strides that have been made in motor car manufacture since the days when the word motorist was synonymous with plutocrat.

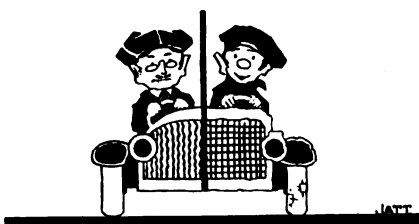


We can hardly bear to relate the bare facts about this bear. As the story goes, or rather as it is transmitted East from Washington, Kan., there is a big, shaggy coated black bear in that town who manouvers a motor car about the streets with skill and tact, equal to that of any motorist. Details are lacking in connection with this story, but it is proper to presume that Mrs. Bruin and the cubs go slivering with the head of the house, who is more fortunate than most motorists, as he does not have to provide any fur coats or wraps for the family.

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Late in January the Georgia State Automobile Association held its annual meeting. Efforts will be made to procure the passage of a bill by the state legislature authorizing the issuance of inter-county road bonds, a bill placing the state automobile license tax fund at the disposal of the State Highway Commission, and a constitutional amendment authorizing the legislature to make direct appropriations for the improvement of roads in Georgia.

The Dixie Highway will receive especial attention during the coming year, as this route is recognized as the important link in the Michigan to Florida travel. Uniform danger signals will be placed on all public highway grade crossings of railroads, and direction signs will be placed on telephone and telegraph poles along public highways and at junction points.



"Off with the old and on with the new," the slogan of progression, as it applies to motoring, is brought to the attention of the public in a graphic manner by a dealer in Providence, R. I., who took an old car and rebuilt and renovated one side and left the other side in a state of dilapidation. On one side the steering wheel is new, as are also the cushions, other equipment, fittings and finish, while on the other side the steering wheel reveals all the marks of wear and age and the other parts and finish are an eyesore. It is needless to describe the mystification experienced by the people upon first viewing this anomaly of motor cars with its two drivers, one neat and alert and the other unkempt and slouched in posture, both seemingly directing the course of the car. It could properly be described as the "Flying Dutchman" of the highways, as it suggests a mirage, viewed sideways.

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The motor vehicle department of Connecticut has issued approximately 55,000 operators' licenses of all classes to date. In 1917 a total of approximately 100,000 of all classes were issued, so that it now appears that about one-half of the total number to be expected for 1918 have already qualified.

The department has instructed all its enforcement officers that every driver is now required to have a 1918 operators' license. Experience has shown that a large number of drivers either forget or neglect to provide themselves with this very necessary document, and the department is using every possible means to call attention to this necessity.

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Many prominent physicians have gone on record as strongly indorsing touring as conducive to longevity, though it is evident that not many people at an advanced age realize the exhilarating effect of long spins in the country air as only a few of the patriarchal type are seen so enjoying themselves. J. E. Steele of Connecticut has adopted this form of recreation to maintain his health and has covered approximately 68,000 miles in his car, most of the time carrying cooking utensils, bedding and a hunting outfit. He recommends the use of the motor car to all those who would enjoy a long and healthy existence.



Like Diogenes with his lantern looking for an honest man, Magistrate House of the New York Traffic Court had almost despaired of finding a conscientious motorist among the many thousands he deals with in a year for violation of some section of the traffic code, when he found a letter at his office from a conscience stricken law violator with the amount of a self-imposed fine enclosed and a request for leniency.

After explaining the circumstances of the accident and naming the scene, the writer stated:

"I stopped immediately after hitting the post, but no officer appeared on the scene and I proceeded to Manhattan street before I found one to whom I could tell my story. He made light of it and advised me to run along.

"But I have some conscience, so I am enclosing \$5, which will be ample, I trust, to repay any damage I did to the post and lamp. I am working in a munitions plant and can ill afford to miss a day here, which I would if summoned to appear in your court."

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It is a long cry from ancient Greece with its classic dances to the present day of motor cars, but the vagaries of fate have coupled the ancient with the modern in a western school where the



"back to nature dances" are taught. These terpsichorean fantasies must necessarily be performed in the open air with but light raiment to restrict the rhythmic movements of the dancers, so the instructor calls into use her motor cars and takes her pupils out into the country to some woodland dell where they are immune from prying eyes.

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Among its other war activities the Ford Motor Co. of Detroit will add that of constructing a fleet of "tanks." A model is now under construction and when it is completed it will be submitted to the War Department for approval. The customary Ford schedule of speed production will be adopted in constructing these machines as soon as the word is received to go ahead, and it is expected that they will be ready for shipment within a few weeks.

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The business men in a Massachusetts town have volunteered to contribute \$1 each per week to a jitney operator so that the latter can maintain an efficient service between the centre of the business section of the town and the outlying districts. The jitney man bought a 40-passenger covered motor truck, but it would have been impossible for him to have operated on the route on regular schedule without the support of the merchants.

Women Take Up the Work of the Man Behind The Man Behind The Gun

Prove Apt In The Operation of The Tractor

As the men of the allied nations take

an automobile or truck, but these facts have proven no barrier to the women who have taken up the work as tractor drivers. Some of the women are wives of farmers who have learned to drive the machines in place of the farm hands at war, but hundreds have learned taking up the work to follow it as a regular occupation.



Testing an 8-16 Avery Tractor at a Training Meet for Women War Workers at Birmingham, England. Certificates Were Awarded for Proficiency in Operating.

up their arms the women must take up the work left idle and in many cases they have done so on an extensive scale. Today women are found in practically every work or service that was formerly performed by man and have shown their ability to make good. Some are in the fields, some in the machine shops, foundries and manufacturing plants, while others drive motor cars or serve as conductors and operators on street railway lines, but in none of these activities is a woman's service any more valuable in the present situation than that of operating the farm tractor, which occupation they have taken up in this country and in Europe.

Tractor schools are being conducted throughout this country and in Great Britain, where the operation, care and maintenance of the farm tractor are taught. Many of the pupils enlisting for instruction in these schools have been women and they are not only apt students, but prove in practise later that they are thoroughly capable of handling the tractors in the many various capacities in which they are designed to work.

In England for the past year hundreds of women have been manning the machines and it is the most unique occupation of the many they have taken up that were formerly considered as calling for the services of men. The machines are ponderous and noisy and their operation requires careful attention on the part of the operator, making their direction even more difficult than that of

obtaining money to promote his substitute for gasoline. The investigation is being held by Alfred J. Talley, assistant district attorney of New York City, who after a conference with William D. Bosler, attorney for Clement, decided that he would give Clement an opportunity to prove the worth of his claims before deciding whether or not he should be made to stand trial on the charge of grand larceny.

Clement's attorney gave out the following statement after his conference with Mr. Talley:

"This demonstration will be to prove that Dr. Clement has a practical motor fuel and will not be a test as to the exact cost, for the reason that the chemicals used will be purchased at retail and of a higher grade of refining quantities than those necessary to be used when manufacturing on a large scale for commercial purposes.

"No claim has ever been made by Dr. Clement that his substitute contains 90-9-10 per cent. water, the exact percentage being about 9-9-10. His claim is that it can be made and sold at a lower price than the present price of gasoline when chemicals and ingredients can be purchased or manufactured by a parent organization in large quantities, thus reducing the first cost of raw materials. However, it is claimed that his fluid has an efficiency test of 70 to 75 per cent., against 55 to 60 per cent. of the ordinary gasoline.

"It is expected that all persons present are pledged on their honor not to reveal any of the principles or chemicals used by Dr. Clement in the making of the test. This is the request of the doctor so that he may have the full protection for his secret in the matter, and I know you will respect his wishes.

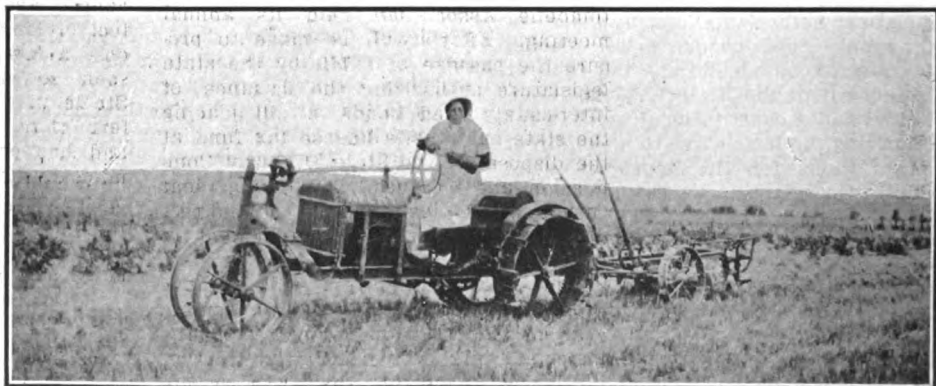
"Further demonstration will be made in aeroplane flights within the next 10 days to demonstrate the efficiency of the substitute."

The test will take place in the Standard Testing Laboratories in New York.

New Motor Fuel To Be Tested

Claims of Danish Inventor Will Be Tried
Out to Settle Question of Placing
Him on Trial.

The new motor fuel which Dr. Louis Clement claimed to have discovered and which received considerable publicity at the time when it was first announced, will be tested by six chemists next week. Heretofore great secrecy has been maintained about the alleged discovery, which resulted in the discoverer being indicted on a charge of grand larceny in

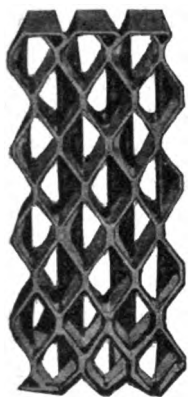


Avery 5-10 Horsepower Tractor That Is Operated by Mrs. Minnie Fitzpatrick, Engaged in Farming at Bridgeport, Neb.

New Truss-Design Radiators Are Efficient

Construction of Sperry Gives Values of Both Honeycomb and Tubular Types.

Broad claims for the appearance and efficiency of Sperry radiators are made by the manufacturer, the Hooven Radiator Co., Chicago, Ill., the construction being such that they have all the quality values of both the honeycomb and tubular types.



Front Vertical Section of Sperry Radiator, Showing Cellular and Tubular Construction.

In design the cooling sections are really a combination of the honeycomb, with large cells and consequent cooling efficiency, and the tubular, that is practically immune from clogging, because of the vertical water chambers. In addition to this the cores have the strength resultant from trussed or bridge design, being extremely rigid, and yet very light. A further claim is that the radiators are unusually efficient from the excep-

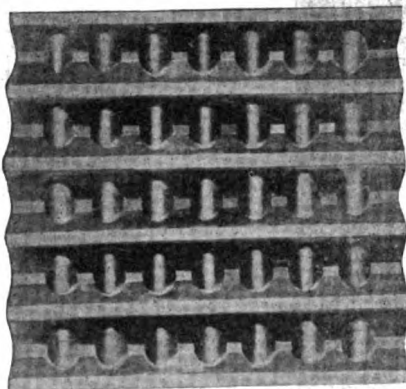
tionally large water chambers.

These radiators are now being produced commercially and are intended for all services—for trucks, tractors, aeroplanes and passenger cars. The design is a new idea in which claim is made that all the qualities of both types are combined with none of the faults of either. The Sperry radiator manufacturer maintains that the design is a distinct advance—the first that has been made in cooling systems, although all other details of engine construction have been materially improved during the past 15 years. This does not apply to processes of manufacture of accuracy of workmanship, but to affording higher efficiency, just as ignition air carburetion have been improved and have been made more dependable and reliable.

The Sperry radiator is unique in design. With reference to its construction the inventor, Mr. Hooven, states that when seen from in front the cooling section has the appearance of a honeycomb, which is regarded by owners and drivers of trucks and cars as being the most slightly construction. When the cross section is noted the ample zigzag canals impress one as affording an unusual degree of radiation and consequent cooling efficiency. But when the top of the core is observed one sees numerous vertical tubes through which there is direct gravity fall of the water content, and from a side view of the core one sees that these are pressed into the zigzag water walls

and are actually a part of the walls.

Mr. Hooven claims that the tubular type radiator has an advantage as compared with a honeycomb type in that it will not clog with sediment or scale, that because of its vertical tubes the Sperry radiator cannot be obstructed so as to affect the circulation of water through it. At the other hand the tubular radiator has less radiating surface and will freeze quicker, and Mr. Hooven maintains that the Sperry radiator has a marked advantage in that the body of water carried is in the large zigzag canals and vertical tubes and there is little probability of freezing. The tubular type, because of greater rigidity and that it may be repaired easily has been preferred for trucks and tractors, and it has greater endurance to road shocks and vibratory stresses. The Sperry construction is such that the vertical tubes are integral with the walls of the zigzag water walls and are substantially braced or trussed. The design especially adapts the Sperry radiator for either truck or tractor equipment. The resistance to freezing is a very potent factor in selecting radiators for aeroplane use, where



Section of Sperry Radiator, Side View, Showing Tubes Integral with the Side Walls of Cells.

they are subjected to low temperatures at high altitudes.

The surfaces where the walls and spacers are joined are unusually wide, this making for ease of soldering and insuring against breakage and leaks. Because of the extremely simple construction Sperry radiators are very easily and quickly repaired—minimum expense in the event of accident being an important factor with many owners. Sperry radiators are claimed to insure engine efficiency because of large water chambers, the volume of water carried being from 35 to 40 per cent. more than either the tubular or honeycomb types. Mr. Hooven claims that the Sperry design is quite as important an advance in efficient engine cooling as was the designing of high speed types in engine construction.

EXPLAINING MANUFACTURE OF "SAWDUST" ALCOHOL.

Motorists with an eye to the fuel of the future are considerably interested in the improvements on the processes of making wood alcohol announced from

time to time by the United States Forest Products laboratory ever since it announced last spring that it is possible to make alcohol from sawdust. The experiments of the laboratory have made it possible to decrease the former cost of production, and the main point of improvement as to economy on the old process is by first reducing the wood to sawdust.

The new process and its advantages over the old are succinctly stated in a bulletin just issued by the Forest Service, which says in part:

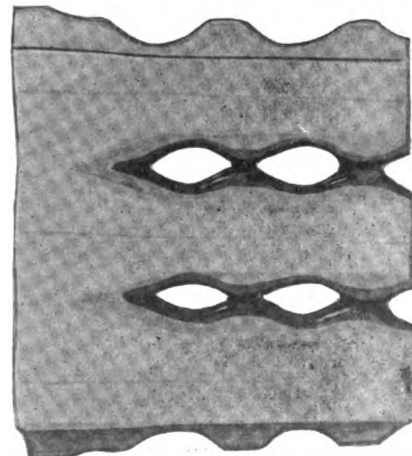
"There is no reason for discriminating against ethyl alcohol made from wood in favor of that from grain or molasses. The amount of impurities in commercial ethyl alcohol is very small and the impurities are probably less objectionable when wood is used as a base than when grain or molasses is used.

"The prejudice against the use for some purposes of ethyl alcohol made from wood is probably accounted for by a confusion with methyl or 'wood' alcohol, which is poisonous. Both products are derived from wood, but are radically different. The ethyl, or grain alcohol, is made by reducing the wood to sawdust, treating the sawdust with an acid to produce chemical sugars and converting the fermentable sugars into alcohol by fermentation, as in the case of grain or molasses. Wood alcohol, however, is obtained by condensing certain gases which are liberated when the wood is heated in air tight retorts, so that it decomposes without burning.

"Ethyl alcohol has been commercially manufactured from wood for several years in this country. It is suitable for any use to which ethyl alcohol from any other base is put."

PENNSYLVANIA LICENSE FEES OVER \$3,000,000.

The State Highway Department of Pennsylvania has already received over \$3,000,000 in automobile license fees and it is expected that at the present rate of registration the total will reach \$3,325,000 within six weeks, or \$1,000,000 more than for the entire year of 1916.



Top View of Section of Sperry Radiator, Showing the Openings of the Vertical Tubes Formed in the Walls of the Honeycomb Cells.

Activities of Prominent Men and Other



Maj. Clinton Armour Who Was With Locomobile Co. of America.

Les W. Place, general sales manager of the Allen Motor Car Co., Fostoria, O., is on his wedding tour, which will include a trip through Southern California and the Hawaiian Islands. Mrs. Place was Miss Vera Clark, daughter of Herbert J. Clark, Groveland Terrace, Minneapolis. Upon their return they will make their home in Fostoria, O., the headquarters of the Allen company. Mr. Place not only heads the sales organization of the Allen industries, but is also sales manager of the truck division of the Turnbull Motor Truck and Wagon Co., Defiance, O.



Les W. Place, Allen Sales Manager, is on His Wedding Tour.

T. P. C. Forbes has joined the forces of the Fulton Motor Truck Co., Farmingdale, L. I., N. Y. He will act as special sales representative. In the early days of the Overland car Mr. Forbes was an associate of John N. Willys.

C. W. Price, formerly president of the Auto Devices Co., St. Louis, has become manager for the Osgood Lens and Supply Co., Chicago, Ill.

Berry Rockwell has resigned as sales manager of the Smith Motor Truck Corporation, Chicago, Ill. He is taking a vacation, after which he will resume his office of vice president of the MacAvoy Advertising Co.

Loyall A. Osborne, vice president of the Westinghouse Electric and Manufacturing Co. and chairman of the executive committee of the National Industrial



Loyall A. Osborne on Committee to Insure Industrial Peace During War.

Conference Board, has been appointed by the secretary of labor, a member of a committee on industrial peace during the war. This committee, which consists of five representatives of employers, five labor leaders and two public men, will provide a definite labor program in order that there may be industrial peace during the war, thus preventing interruption of industrial production vital to the war.

Russell T. Gray, formerly advertising manager of the Haynes Automobile Co., has entered business for himself as advertising manager, and has opened offices in the First National Bank building, Chicago, Ill.

D. B. Williams, who was formerly with the Mutual Motors Co., Jackson, Mich., has joined the Clydesdale Motor Truck Co., Clydesdale, O.

E. W. Arbogast, for several years connected with the retail distribution in St. Louis, has joined the staff of the F. B. Stearns Co. as district sales manager.

Richard Bacon has been appointed



F. H. Burdette, Pacific Coast Sales Manager of Hercules Truck.

special representative of the Liberty Motor Co., Kansas City, Mo. He was formerly president of the Chalmers Motor Co., Detroit, Mich.

William D. Paine has resigned as eastern sales manager for the Saxon Motor Car Co. and has been commissioned a captain in the Ordnance Officers' Reserve Corps.

F. W. Schwerdtseger has been made designing engineer for the Air-O-Flex Automobile Corporation, Detroit, Mich., and has charge of the responsibilities of working out details of the truck upon which is to be used the company's distinctive method of suspension. In 1909 Mr. Schwerdtseger entered the automobile industry.



Elmer Apperson Retires from Active Management of Automobile Business He Founded 25 Years Ago.

Personal News of Motor Industry in Brief



J. J. Kelleher, Sales Manager of Stenman Electric Valve Grinder Co.

J. J. Kelleher has taken the position of sales manager with the Stenman Electric Valve Grinder Co. of Worcester, Mass., manufacturers of electric valve grinders, electric drills and other labor saving devices for the use of garage, machine and repair shops. For the past 20 years Mr. Kelleher has traveled the eastern states as a salesman, calling on the bicycle, hardware and motor trades. In 1910 he engaged in business for himself as a manufacturer's agent, handling several factory accounts in the motor accessory line for the eastern states.

E. C. Morse has been appointed vice president of the Curtiss Aeroplane and Motors Corporation. He was former vice president of the Chalmers company. For some time he was a representative of the

John Willys interests, including the Willys-Overland and Curtiss company.

Charles Hatch has joined the Commercial Car Unit Co., Philadelphia, Pa. He will devote his attention to selling the Commercial Car Unit Co.'s Truxton truck making attachment. Mr. Hatch was formerly with the Perfection Spring Co. and lately with Parish & Bingham.

Charles Oostydke has been appointed director of purchasing by the Hudson Motor Car Co., Detroit. He was formerly purchasing agent for the Cadillac. In his new position he succeeds A. Barrett, who has become treasurer of the Essex Automobile Co.

Norman G. Wilson is now sales manager of the Philadelphia, Pa., branch of the Stanley Motor Carriage Co. He was formerly connected with the Packard



F. W. A. Vesper, President of National Automobile Dealers' Association.

formerly with the Detroit branch of the Goodrich Rubber Co.

F. H. Burdette, formerly Pacific coast manager of the Four Wheel Drive Co. of Clintonville and before then eastern representative of the Stewart truck, has joined the new Hercules sales organization and will have charge of Hercules truck sales on the Pacific coast, where an aggressive sales campaign is in progress.

A. E. Barlow, formerly sales manager for the American Ever-Ready Co. and for Findeisen & Kropf of Chicago, has been appointed sales manager of Boyce Motor-Meter Co., Long Island City. He will have full charge of the sales to dealers and jobbers, with headquarters at the factory.



H. L. McClaren, New President of the Ajax Rubber Co., Inc.

business in Bethlehem, Pa. In 1914 he was assistant to the president in the Stanley home offices in Newton, Mass.

Elmer E. Caldwell has been appointed assistant to Charles R. Collins, advertising manager of the Ajax Rubber Co., New York City. He has had considerable experience in both the tire and automobile fields, gained as assistant advertising manager of the Michelin Tire Co. at Milltown, N. J., and was manager of Canadian advertising for Willys-Overland, Inc., at Toronto, going there from the Overland factories at Toledo.

Arthur M. Robbins, one of the pioneers of the automobile trade, has been appointed manager of the Chalmers New York branch. He was formerly head of the Centaur Motor Co. of Chicago, the largest distributors of Jeffery cars in the country.

B. G. Koether, manager of the Hyatt Roller Bearing Co., Detroit, has announced the appointment of C. E. MacConnell as a member of the Hyatt staff of sales engineers. Mr. MacConnell was



E. C. Morse, Vice President of the Curtiss Aeroplane and Motors Corporation.



H. C. Bradfield, King Advertising Manager, Resigns.

Silk Sweaters and Suits For Spring Wear

Light, Bright and Flashing Apparel Will
Vie With Easter's Efflorescent Flora

THERE were some well meaning but sadly misguided enthusiasts who started a "Don't buy any clothes" movement directly after America joined the cause of the Allies, and this movement might have had very disastrous consequences had it not been for the sound common sense of some of our leaders of fashion. Thousands and thousands of workers, both male and female, depend for their very existence upon the preservation of normal conditions in the huge industries which make up the trade in wearing apparel. Upon the starting of the movement whereby no clothing was to be purchased unless absolutely necessary, the wife of the President and the wives of the Cabinet, together with other thinking women, headed a strong condemnation of such a proposal and have replaced the slogan by "Buy more carefully than ever before." In France and England, the best guides in this matter, good dressing and careful buying are recognized as important, not only for the preservation of the large clothing industries of the nation, but also as a great aid in keeping up the morale of the men actively engaged in the war and also of the people at home. No woman should allow her general appearance to deteriorate under any circumstances and by keeping herself up-to-the-minute and purchasing smart and attractive clothing, she is by no means unpatriotic.

"Sammie Helmet" is New

Motor millinery always shows the earliest signs of the season's changes and where a few years ago it was impossible to find such a thing as a hat created especially for motoring, there are now hats galore. Motor hats must fit the head, but there are both small and large models shown, depending of course just where the destination of the wearer may be or whether the hat is worn for nearby social affairs or for touring. I am showing two very admirable models called the "Fairfame" and the "Witchtex," which are both smart and durable. There is also a Fairfame Military cap for the motor woman made of black and white checked mercerized cloth and also in silk poplin in many new colors, which is really very swagger. Another Fairfame is called the Trench hat and is made of silk poplin. There are also several smart Witchtex models, which will please the motorist vastly.

The "Sammie Helmet" is an exact duplicate in shape and size of the soldier's steel helmet. Milady Mobile's, however, is fashioned of silk. There is a smart bow of patent leather, giving an effective relief to the front. A chin strap of the shiny leather faced with the silk to match the hat carries out the helmet idea in detail, and adds a bit of color contrast.

By Mrs. A. Sherman Hitchcock

A jockey motor hat has a square front to the visor. The crown is of silk, the brim of straw. There is no trimming except a tiny bow at the back of the crown. There are many motor turbans. Some are mushroom shaped and have a



For motoring there is nothing smarter than a well tailored homespun coat of the new three-quarter length. This Printzess model repeats the modish features of the newest London models in its narrow belt of the material, pinch back with deep inverted box pleats and convertible collar. The front shows the six-button, double-breasted effect and slot pockets.

(Courtesy Printz-Biederman Co., Cleveland, O.)

veil attached. In fact, a particular feature of the new motor hats display is that the veils, instead of being on a band or ribbon, are placed and so arranged as part of the trimming of the hat and are held in place with large wooden beads of primitive colorings. On some the veil buttons on. The veils repeat the general color scheme of the hat. Caterpillar braid and crocheted effects are noted to a considerable extent in motor millinery. Popular colors are rose, honeybird, turquoise blue, gray, purple and many shades of brown.

A decidedly new fad, but one that is rapidly developing among society motorists, is the donning of riding habits for motoring. In Pasadena and also at Palm Beach, where there are many women from the snow-bound cities of the East, habits to motor in have become the rage. Breeches, boots or puttees, and riding coats with pockets and a jaunty hat are a delight to motor women who run about in their roadsters. These habits are made from woolen materials and also linen and crash are greatly worn on the hot days. A wool coat and linen breeches is particularly favored. Black and white is the fashionable combinations and especially in checks.

Dragonía Shantungs

While every motor woman will need one warm coat of wool, it will be very good style when the spring days come to wear garments of silk. Prominent designers are planning some very stunning tailored coats, frocks and suits for the motorist of the heavily woven Dragonía Shantung. These may be adopted for motor wear instead of the light serge garments of other years, and they will answer every purpose of style and efficient service. The Dragonía Shantungs, which are among the smartest of all new materials for spring and summer, come in the natural pongee color and in several different weights and weaves. There are two of the heavy quality, which are wonderful in texture and which it will be almost impossible to wear out. Nothing could be more ideal for motoring wear in every particular and they are exceedingly smart. There are lighter weights, suitable for the frock and blouse. They come in about a yard wide width and at a price which seems remarkably reasonable in view of their excellence. Pongees and Shantungs have been great favorites of the motor woman ever since the advent of the motor car on account of their wonderful wearing qualities and smart style, and the uses to which they may be put are many. The new sleeveless jackets, sweaters, separate skirts, blouses, frocks, suits, coats and millinery are all most admirable when made from Dragonía Shantung. A motor frock of



Very exclusive, original and charming is the new knitted silk sweater made entirely of ribbon. It gives warmth and beauty, and also releases much needed wool for government purposes and may easily be made by any motor woman who can knit—and where is there a woman who cannot knit in these days? The hat band is also knitted of ribbon to match the sweater and a motor bag of the same adds greatly to this charming set.

(Courtesy R. & H. Simon Co., New York City.)

this material is given a novelty effect by having the skirt section braided heavily with self colored soutache and a vest of white satin. Another frock appears with paneled jacket and box pleated skirt and a collar of brushed wool in a bright rose. A sleeveless jacket of the same brushed wool is cross stitched in white and accompanies the frock. A smart and interesting trimming effect which appears in a number of the Dragonia Shantung frocks for motoring is the grouping of fine tucks, which gives the appearance of cordings and makes a decidedly modish style. In a four paneled frock the panels and square neck are edged with tiny tucks and the frock girdled with a high patent leather belt. Nothing has greater prestige this year in fashion's realm than the separate skirt to be worn with blouses of thin crepe or crepe de chine. For motoring a long cover-all coat and a smart separate skirt of Dragonia Shantung would be eminently proper and attractive and if the motorist makes this selection for her touring she will have the satisfaction that, no matter where she stops or what class of tourists she may be thrown among, it would be out of the question to improve her motoring raiment. Add to this the satisfaction that the garments will stand the hardest kind of wear and still retain their attractiveness and she will realize

that pongees and shantungs are above all motoring materials.

The sweater shown herein is one of the latest ideas for the motor woman. This slip-over model is knitted of very narrow French blue satin ribbon. A thousand yards of baby ribbon went into the making of this sweater and as regards cost it is less than that of the average silk sweater. In making one of these handsome garments use the same needles and knit the garment in exactly the same way as with yarn. The Regatta brand of ribbon is especially adapted to knitting and is so lovely a quality and embraces such charming colors that it makes the finished garment wonderfully effective. The hat band, shown in the illustration, is also knitted of the same colored ribbon and is wound around a hat of bangkok straw which exactly matches the dull French blue of the ribbon in color. Dark red, purple, green, yellow and gold are smart and distinctive when knitted of ribbon. They may be made sleeveless, slip-overs and coat style. Belts may be added, or a sash, or left quite plain. The coat style should have pockets. Sweaters of this description will require from 600 to 900 yards of baby ribbon, some No. 1 and some No. 1½. It is delightful work and the motorist who knits should go forth clad in one of these lovely garments. Motor bags are also knitted of the ribbon to match the sweater. These garments are exceptionally strong and durable and will last eternally.

Capes of Tartan Plaid

Long wool capes of tartan plaid, made absolutely plain, straight hanging, with high turnover collar, and vent for arm, trimmed with rows of dark colored stitching are to be very popular for motor wear over frocks of wash silk or cotton. The tweed coat illustrated is an advance model. It is decidedly mannish in appearance and possesses all the excellent features always found in the Printzess models. The same model may be had in the popular gray, tan, green and rookie, all wool homespun mixtures, with a narrow leather belt.

Now is the time when the motor woman is preparing her spring and summer wardrobe and she should take a peep at the new Red Seal Zephyr Gingham which show entirely new designs and most exclusive patterns. Gingham are one of the established favorites in motor frocks and many women who are preparing their wardrobes for trips, or for seaside or country, are buying as many as five or six frocks of this material. To the woman who knows the excellence of the Red Seal Zephyrs no recommendation is necessary and this season they are unusually attractive. The colors shown in this material are lovely and they are guaranteed not to fade. There is a green and white checked pattern which is very smart and effective and another of charm is a blue and white in a somewhat larger check. There are some lovely effects in browns and tans in unusual plaids and there are also very desirable plain shades. Mate-

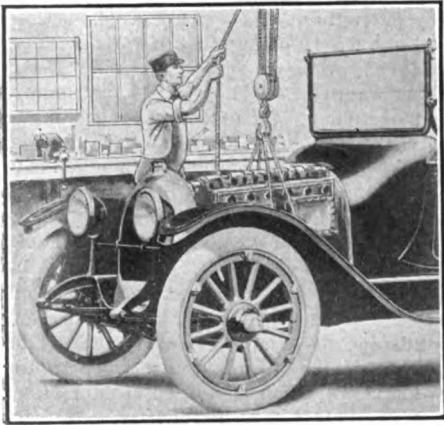
rials which will wash well are so practical for the motor picnic occasion, when the participant may enjoy a good time without worry of spoiling her frock.

Have you seen the very new "Wear-Right" gloves? They are very smart and exclusive. In gloves they are made up with three and four-row embroideries, both self and contrasting, in black, gray, tan and white. Some of the new models have little hems on the top, black hem on the white and white hem on the black, etc. Something very original in the "Wear-Right" gloves are the "Four Aces." These are silk gloves of very handsome style and pattern and will be sure to please the most fastidious motor woman. One has a striped ribbon effect and one clasp. Others have contrast embroidery, self and black. One model is made up with side clasps. The "Wear-Right" gloves are a great favorite with a large majority of motor women who have found them to be unusual in their wearing qualities.



With the scarcity of wool impressed upon us the suit of silk for the motoring sport will be both popular and patriotic and will be greatly in evidence during the coming season. Made of the new and modish Ruff-a-Nuff, or Amphora, this model is very distinctive and well adapted to wear beneath the cover-all coat when occasion demands. The smart Rawak motor hat has a front of Ruff-a-Nuff silk.

(Posed by Fay Marbe. Suit by Schnall, New York City.)



Overhauling *The* Automobile

FRANKLIN SERIES EIGHT

This is the 17th of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The 18th article of this series will appear in the March 25th issue of the Automobile Journal.

FOR all practical purposes the directions for overhauling the Franklin car of all models, since 1914, are the same, but this article is devoted specifically to the series eight car, the 1916 model.

This engine is of the air cooled type, the space under the hood being divided horizontally by a partition. Air enters through the front and beneath the hood and is drawn down past the cylinders into the lower compartment by the action of the rotary fan in the flywheel. The valves are in the head and for grinding them, as well as for carbon removal, it is necessary to remove the cylinder castings from the crank case.

Between the clutch, which is mounted on the flywheel, and the transmission, which is located amidships, is a small length of shaft with two joints. This arrangement permits the removal of the transmission, without disturbing the engine or clutch.

The removal of the rocker arm supports and cages is the first step in the overhaul of the Franklin car. These are mounted in pairs upon pins which are retained by caps and cap screws. The push rods are fastened to the rocker arm by pins, which are retained by cotter pins in the ends. For silent operation it is essential that the rocker arms and push rod pins fit together with practically no lost motion, but they must not be so tightly fitted as to bind.

Both the intake and exhaust manifolds may be left in the car and attached to the chassis if the only repairs necessary are valve grinding and carbon removal. Remove the cap screws fastening the manifolds to the various cylinders and take off the nuts which hold the cylinder flanges to the crank case. The cylinders may then be lifted off.

A conventional pin and cup washer retains the valve spring, which may be compressed with a lever, the pin and retainers removed and the spring taken off. A second pin in the valve stem acts as a safeguard against the dropping of the valve into the cylinder in case of breakage of the first spring retaining pin.

In replacing the assembly be sure that the second or safety pin is put back into place before the spring is replaced.

The valves may be ground, but before grinding a careful examination should be made of the valve guides. It is essential that the valve stems fit the guides or bushings or the engine will not develop its full amount of power. Should examination reveal excess wear in the valve bushings, they

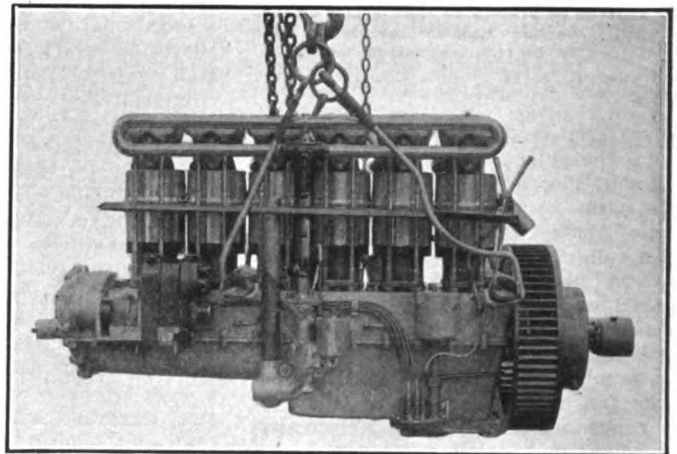
should be driven out toward the inside of the cylinders and replaced with new.

After the grinding operation the cylinders should be given a thorough washing with kerosene oil to remove all of the grinding paste. If the valves of each cylinder are taken separately there will be no trouble from interchanging the parts.

A careful examination should be made of the cylinder walls for scores or scratches. Scores in the cylinder walls may be repaired by welding or by the plating process. Either repair must be made by one experienced in this sort of work.

With the cylinders removed practically all of the units in the crank case may be examined for breakage or wear. As a general rule, in an ordinary overhaul, there is little need of removing either the cam or crank shaft, and in the case of the Franklin car, unless the crankshaft must be removed, the engine need not be taken from the car.

The oil pan is next removed, together with the oil pump, which is bolted to the left side. Disconnect the oil tubes



Side View of the Air-Cooled Engine, Showing Method of Attaching Tackle for Removal from Chassis.

from the pump, remove the oil base bolts and drop the base from the engine.

No part of the engine is more essential than the oiling system, and to give maximum wear the oiling system should be kept to its best possible point of efficiency. Remove all of the oil tubes, one at a time, and clean them with kerosene oil, forcing out any foreign substance by means of a piece of spring brass or iron wire.

Remove the bottom of the pump body and be sure that this unit is in proper condition. If it has not been functioning properly it should be taken to a service station for repairs or replacements.

The front of the timing gear case is next removed, exposing the starting, timing sprockets and chains. The generator wiring should next be properly tagged and disconnected. This unit is retained upon the timing gear case by three cap screws, which are exposed upon removal of the timing case

cover. All three of the screws are wired in place and in replacing the unit the wires must be put back. Remove the wires and screws and slip the generator from the timing gear case.

The hand crank device with shaft and clutch are mounted in the timing gear case cover and there should be no reason for removing them. If it is found necessary to disassemble the cranking device, remove the set screw in the crank clutch and unscrew the clutch from the hand crank shaft. The shaft may then be taken out.

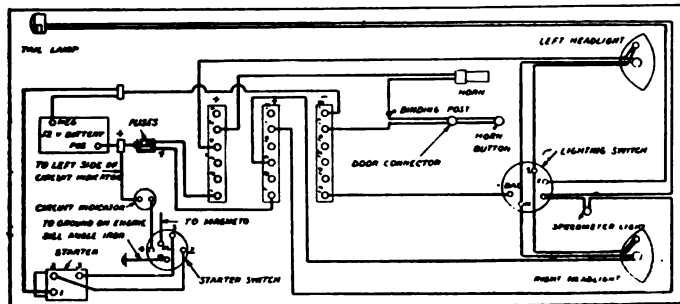
The clutch on the end of the crank shaft is fastened in a similar manner. To remove the timing and starting gears the crankshaft clutch is removed and the gears pulled from the shaft with a wheel puller.

A castellated nut retains the timing sprocket on the camshaft. Remove the nut and pull the sprocket from the shaft, either with a wheel puller or with two screws and an iron bar. For this purpose the timing sprocket is tapped with two holes.

All of the camshaft bearings are fastened by means of set screws in to place. When the set screws have been removed the bearings may be driven out with a metal rod and hammer. With the bearings removed the camshaft may be taken out from the front of the engine. Unless the valve tappets are held up, by means of wire, they will drop into the camshaft recesses, and prevent the removal of this member.

After the magneto clamp has been removed this unit may be slipped from the housing, without removing the magneto gear. Should the motor-generator or magneto need repairs they should be carried to a service station or returned to the manufacturers.

At this point an examination of the main bearings should

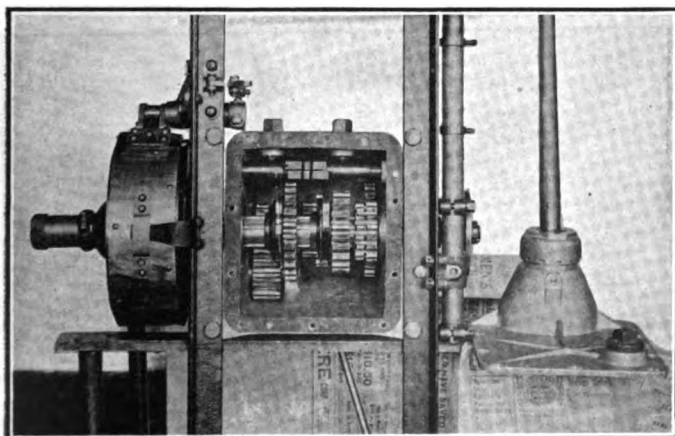


Wiring Diagram of the Franklin Series Eight, 1916 Model.

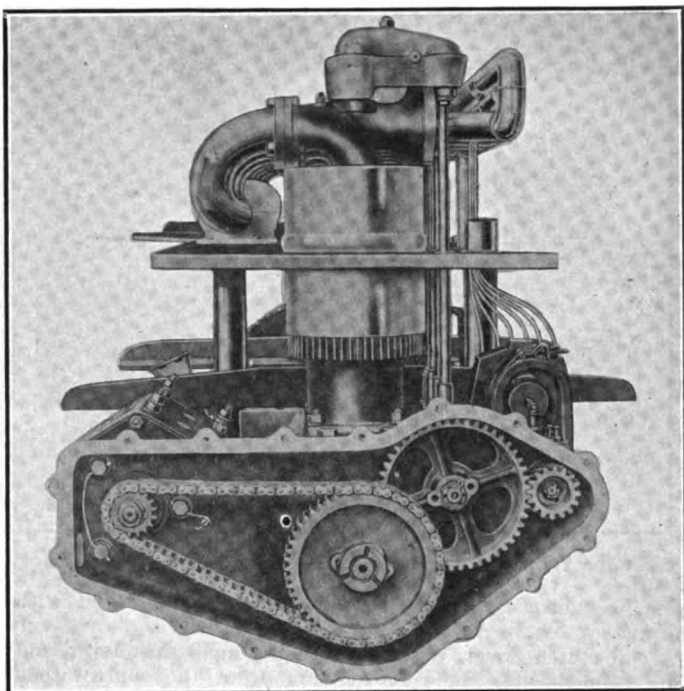
be made. Unless the main bearings are burned out, or the babbitt broken, it will be unnecessary to remove the crank case and crankshaft from the chassis. As the engine is fitted with seven main bearings, the chances for wear are very slight and for ordinary purposes and repairs the removal of the entire engine is needless.

If, however, upon examination, the upper parts of the main bearings need replacement, or the crankshaft needs repairs, the clutch and flywheel should be removed as directed later in this article.

Before lifting the engine from the chassis the manifolds



Top View of Franklin Transmission and Case, Showing Cover Removed With Gear Shift Lever.



End View of Engine Showing Camshaft, Magneto and Generator Gears. The Latter With Silent Chain.

should be removed and the horizontal steel plate, which is fastened to the dash taken off, leaving the upper part of the chassis free. The engine supports are bolted to the frame at four points, and when these bolts are removed the engine may be lifted forward free from the frame.

Before removing the clutch, unbolt the transmission retaining bolts and slip that unit back for two or three inches, permitting the removal of the tumble shaft from between the clutch and transmission.

The clutch drum is retained by 12 cap screws with large heads, while evenly spaced between them are six smaller machine screws, which retain the clutch disc retainer plate. One should be careful not to unscrew the nuts from these smaller screws, but take out the larger machine screws.

With the cap screws removed the clutch assembly may be removed from the flywheel. The coupling on the end of the drive shaft is keyed to the shaft, which is tapered, and retained by a lock nut. This member is next removed and the clutch assembly placed beneath a press to compress the clutch spring. The six clutch disc retainer screw nuts are then removed and the clutch disassembled. Under no condition should the clutch disc retainer nuts be released unless provision is made for holding the clutch spring, for should this be done, the sudden expansion of the spring forcing the clutch apart may result in severe injury to the operator.

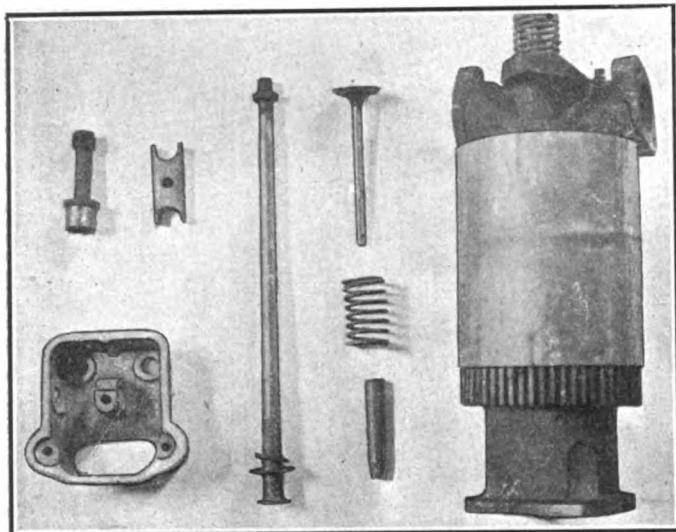
In all there are 25 friction plates, 12 are keyed to the clutch driving member, while the other 13 are fitted into the clutch drum. Each disc should be tried into its respective place and should there be an excessive amount of wear, as evidenced by circular play, the disc or keys should be replaced with new.

Be sure to examine all of the keys which are riveted to their respective members. Practically all of the driving strain comes on the keys, which may work loose in time and cause trouble unless the rivets are kept tight. In replacing rivets the hole should be reamed and larger rivets used if the old holes cannot be fitted.

A bushing is driven into the clutch drive shaft. It is important that this bushing be a free sliding fit on the crankshaft extension with no perceptible play.

If trouble has been experienced with oil leakage past the drive shaft, a new felt washer should be put in place at this time. The washer is retained by a sheet iron collar, riveted to the clutch housing, and may be replaced without removing the collar.

The ball thrust bearings have case hardened raceways, which should be given a careful examination for wear. Upon



Cylinder With Air Jacket, Valve Assembly Parts and Case.

evidences of wear these bearings should be replaced with new.

The clutch cover, together with the gear shift lever and forks, should next be removed, and after the control rods have been disconnected and universal joint at the rear uncoupled, the transmission retaining bolts should be removed and the transmission lifted from the frame.

The bolts which fasten the halves of the front universal joint together also serve to retain the transmission brake drum and should next be removed and the universal joint disassembled. The front universal joint member is retained to the taper transmission shaft by a castellated nut and a key. After the nut has been taken off the member may be pulled from the shaft with a wheel puller, permitting the removal of the transmission brake assembly. The coupling member on the transmission driving shaft is keyed and retained by a nut and removed in the same way as the universal member.

The front covers and bearing retainers, all of which are retained by cap screws, are next removed, the outer ball races driven out with a block of wood and hammer, and all the transmission gears removed, with the exception of the reverse pinion, which is mounted on a short stud, retained by a pin from the outside of the casing.

All of the rivets which retain the countershaft gears should be given a careful examination and replaced should they show signs of wear, or if the gears are loose on their mountings.

A fabric lining is fitted inside the transmission brake band. This lining should be given a cleaning with kerosene oil and a stiff brush. Should it show signs of wear it should be replaced with new. In riveting the fabric to the drum one should be careful to sink the rivet heads below the surface of the fabric or the efficiency of the fabric will be lost.

Though the rear axle is of the semi-floating type, it may be disassembled without removing the housing from the car. Support the car upon planks or horses and after removing the hub caps and wheel retaining nuts pull the wheels from the axles.

With the wheels removed the bearing retainers and shaft adjustments are exposed. The hub bearing retainer is screwed into the housing and should be removed next, taking with it the roller bearings and permitting the withdrawal of the axles.

Remove the differential cover plate and after taking off the two differential bearing caps the differential may be withdrawn through the back of the housing. In all cases where the differential housing is fitted with adjusting nuts one should not remove the nuts from the housing unless inspection shows that such a step is necessary for repairs. The reason for this is that when the machine leaves the factory the pinion and differential are properly adjusted, and if the adjusting nuts on the differential are not disturbed the proper assembling of the unit is made much easier.

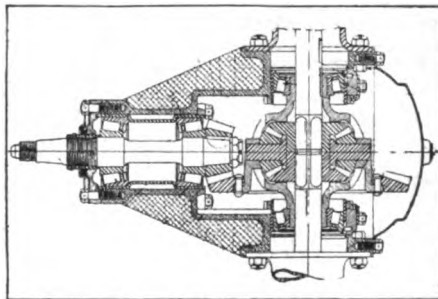
The differential is disassembled by the removal of the cap

screws, 12 in number, which fasten the two differential housings together. Make a careful examination of the rivets holding the master gear to the differential housing and be sure that they are tight. Should the master gear be loose on the housing the old rivets should be removed, the holes reamed and larger rivets fitted.

After the flange of the rear universal joint, which is keyed and held by a set screw, has been taken from the pinion gear shaft, the four cap screws retaining the pinion shaft cover, should be removed and the cover taken off. The bevel pinion bearing retainer is then exposed and this unit is next unscrewed from the housing.

The bevel pinion bearing retainer contains the assembly of two roller bearings, cages and the pinion shaft. The shaft is fitted with the bevel gear on one end, forming one part of the thrust shoulder, as the pinion rests against the rear roller bearing inner race. The front end of the gear shaft is fitted with a nut adjustment and lock nut, which must next be removed. The pinion may then be pulled from the housing toward the rear. With the pinion removed the two roller bearings may be driven out if necessary, the rear bearing toward the rear and the front bearing toward the front.

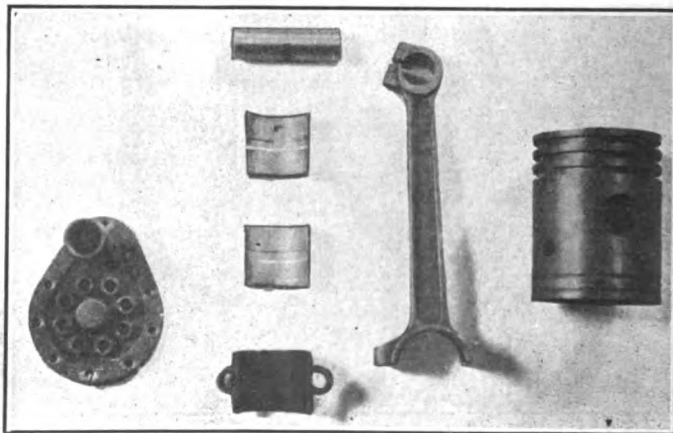
In assembling the rear axle the roller bearings are first put into place, being sure that they are driven tight against their respective seats. The pinion shaft is next inserted and the pinion adjusting nut replaced. This nut should be tightened until there is but the least perceptible end play in the pinion shaft. In every case where taper roller bearings are used a slight amount of end play should be left or the bearings will wear rapidly.



Differential Gear Assembly.

The bevel pinion bearing retainer is next screwed into place and the differential assembly clamped into its bearing retainers. Proper side adjustment of the differential assembly and end adjustment of the bevel pinion bearing retainer should next be made so that the back of the pinion gear is on a line with the back of the master gear and so that the teeth of the two gears "bottom" with each other. The pinion gear is then backed away from the master gear slightly less than 1/64 of an inch, and the master gear backed away from the pinion an equal distance. The differential adjusting collars should then be tightened so as to leave only a slight amount of end play and the assembly tested as follows:

(Continued on Page 47.)



Oil Pump Cover, Piston, Wristpin, Connecting Rod Assembly With Cap and Bearings.

N. A. C. C. Members Will Curtail Car Production

Total of 117 Automobile Manufacturers Will Reduce the Unfinished Schedules For Passenger Car Output Thirty Per Cent.

A total of 117 automobile manufacturers, members of the National Automobile Chamber of Commerce, will make a reduction of 30 per cent. in the uncompleted schedules of passenger cars for the current fiscal year. To what extent this curtailment in production will reduce the total output for the season is as yet unknown, as no figures are available as to the number of cars that have been turned out to date by these manufacturers and what portion of their total schedule has been manufactured.

Representatives of several of the largest automobile manufacturing concerns in the industry were called to Washington some time ago at the request of the War Industries Board and the Fuel Administration, to discuss the situation and determine to what extent further assistance might be rendered and the government needs supplied.

A review of the situation covering a period of several weeks resulted in the proposal of the representatives of the N. A. C. C. of a voluntary reduction in its uncompleted schedules as stated.

This arrangement has been declared satisfactory to the War Industries Board, the Fuel Administration and the manufacturers, permitting the latter to adjust their affairs to meet the government program without unnecessary business and financial disturbance.

The importance of the automobile industry and the prominent part it is taking in connection with war work, already supplying Liberty motors and aircraft equipment, trucks, ambulances, munitions, gun carriages, field and road tractors and tanks is daily becoming more apparent, and in order to take up this work the car manufacturers will be obliged to divert their organizations and manufacturing equipment from automobile production.

To further coordinate the war needs of the government with the capacities of the automobile plants, the National Automobile Chamber of Commerce decided to establish a general headquarters at Washington in charge of Hugh Chalmers, vice president of the association and chairman of the Chalmers Motor Co.

Work of this kind has been cared for by the Automobile Industries Committee, which it was voted to dissolve and to have the automobile manufacturers represented at Washington by a vice president and staff of the organization. Engineers to help manufacturers in connection with government work, will be located at headquarters.

A vote of thanks was extended to the members of the Automobile Industries Committee for the work accomplished at Washington and the members passed a resolution indorsing the work of the newly formed Highways Industries As-

sociation and appointed William E. Metzger and Windsor T. White to represent the motor car and truck manufacturers in that organization.

LA SALLE COUNTY GARAGE MEN FORM ASSOCIATION.

The garage owners and automobile dealers of La Salle county, Illinois, have formed a local association for the purpose of advancing and safeguarding the business interest of La Salle county.

Mr. Matt Knauf of Peru was elected president and Mr. Will Kinder of La Salle Auto Co. was elected secretary and treasurer. About 15 of the leading dealers were present and made application for membership. The association affiliated with the state association of Garage Owners and Automobile Dealers.

Rieman President of Elgin Motor Car Corp.

Business Founded Two Years Ago Now Has Daily Production Capacity of 100 Cars.

Announcement has just been made of the recent election of C. S. Rieman to the presidency of the Elgin Motor Car Corporation, Chicago, which he founded about two years ago. Mr. Rieman has been vice president and general manager of the company since its organization, and with the presidency he retains the title of general manager.

Mr. Rieman has been in full charge of all departments of the business since its beginning, and his elevation to the presidency is a well deserved tribute to the tremendous creating and organizing energy, managerial ability, tireless industry, which has been responsible for bringing the company to its present high standing in automobile and financial circles.

Under the management of Mr. Rieman the Elgin Corporation has made phenomenal records in growth and financial strength.

Starting manufacturing operations less than two years ago the Elgin company has been built up to a point where it now has one of the finest automobile factories in the country, with a production capacity of 100 cars per day, or \$30,000,000 worth of automobiles a year.

The Elgin factory of modern steel and brick construction, with its 600 feet of conveyor assembly system, is said to be one of the finest automobile plants in the country, both as to building and equip-

ment. The new Elgin administration building, adjacent to the main factory, will be ready for occupancy within a few days.

The company's second year showed increases over the first of 1074 per cent. in sales and 2000 per cent. in assets, a record which has probably never been equaled even in the automobile business. The Elgin company started operations in a small rented frame building. Soon thereafter a factory site was purchased and construction work has been going on almost continuously since that time. During the busy season last year two large circus tents were used to supple-



C. S. Rieman, New Head of Elgin Motor Car Corporation of Chicago.

ment the factory space, while new additions could be completed. Today the company owns 8½ acres of ground and the buildings contain more than 200,000 square feet of floor space, and is backed by paid in capital of approximately \$3,000,000.

The success of the Elgin company has been its remarkable management, which has been progressive and aggressive, and under the direction of Mr. Rieman a strong organization of automobile executives has carried the company forward.

The Motor Car a Twentieth Century Necessity

Its Use Has Become Second Nature

ACCUSTOMED as the average owner is to depend on his automobile, it would be hard for him to figure what he would do without it. The passenger car has fitted into his every day life so naturally, enabling him to meet the demands which competition has forced upon him to keep up the 20th century pace at which the business world is moving, that its utility and use actually dominates his activities.

To the business executive the use of his automobile in meeting the varied requirements of his business interests has become second nature. He no more thinks of how it saves him time, labor and keeps him from the many distracting annoyances of other forms of travel, than he considers the steps the office elevators save him.

He has forgotten that not many years ago he had to trust to the uncertain public conveyances, necessitating a loss of time, in having to start earlier than he does now. He has forgotten that in the old days he was not free from interruption so he could plan for the day's work while on his way to the office. He does not realize that his car makes it possible to keep in personal touch with a dozen different business interests in different parts of the city, a feat that was impossible before the advent of the automobile. He does not stop to think that the automobile has practically doubled the number of working minutes in his hours, that he now covers five miles to his one mile of yesterday, and that he can do all this at less exertion than he expended before he purchased his automobile. His week-end trips to the country club or Sunday at his country home is now a matter of a few hours by motor, enjoying the trip and getting relaxation and rest throughout every mile.

A few weeks ago a business acquaintance of mine drove to the factory for the purpose of selecting a new car. I asked him what uses he put his car to and he replied that outside of week-end tours in the summer and trips with his family about town on holidays and Sun-

With Professional and Business Men

By GEORGE A. KISSEL.
President of Kissel Motor Car Co.



Accustomed as the Owner is to Depend
on His Automobile It Would Be
Hard for Him to Figure What
to Do Without It.

days, his car was used almost exclusively in visiting different contracting jobs he had under way in different parts of the city, and at times, in different parts of the state.

He said that I had no idea how his automobile enabled him to always bring a fresh and clear mind to bear on each problem, irrespective of the fact that he

was doing more work now than he thought was possible a few years ago. He was at that time on a trip North, where he had a big contracting job under way. On the way to his destination were a couple of smaller jobs, which he intended stopping to inspect. During the past year he had at least 15 to 20 different jobs, which he had been able to personally visit and keep in touch with, the ones close in every day and the outlying jobs once or twice a week. Since adopting that policy he has not only secured better cooperation from his foremen and employees, but has gained a reputation of always "being on the job."

This man, without an automobile, could not cover one-fifth the ground he does with horse or wagon or railroad, and even in covering this one-fifth he would not always feel the same physically or mentally.

I know of another business man, a broker, who has made a specialty of dealing in farm mortgages, who uses his automobile for visiting not only the different farms in which he is interested, but also in calling on other farmers, who might desire to avail themselves of his services. This man, through the automobile, is able to cover territory through which the railroad does not pass, and which, by horse or wagon, would be a slow and tedious journey.

I understand that during the recent sale of a well known encyclopedia the different sales agencies furnished automobiles for their salesmen whose territories were in the outlying agricultural districts. Through the dependability and quickness of the automobile these men were able to cover their territory in less than one-third the time and at less expense than it took in disposing of the previous edition, when the horse and wagon had been used.

I have often wondered whether those industries employing salesmen whom they have furnished automobiles, have ever kept an accurate check on the expense and time the cars saved. I know of one such manufacturer who since



The Contractor Said That I had No Idea How His Automobile Enabled Him to Always Bring a Fresh and Clear Mind to Bear on Each Problem—During the Past Year He Had at Least 15 to 20 Different Jobs Which He Had Been Able to Visit Every Day.



Most Every Fire Department Now Has Become Motorized. It Not Only Saves Time, but Lives and Property.

equipping their sales force with automobiles has opened up scores of new accounts in small country towns, which were formerly too far away from the beaten track to reach by railroad or by team.

I could enumerate countless other examples of how the automobile is proving a necessary utility among business executives, as well as manufacturers and salesmen, but they would more or less be similar as the examples I have cited.

While the automobile has enabled business men to accomplish seemingly impossible feats in the business world, its utility among professional men is even more marked. Perhaps to no other one class of professional men has the automobile helped to accomplish so valuable a service and has meant so much to the health and life of the nation as the medical profession. The services of a doctor, when needed, are needed in a hurry. Every minute lost in getting to a patient adds hours in convalescing, if nothing more serious results. The time formerly wasted in hitching up horse and buggy, the snail's pace which the best of horses had to make at night, is now saved and is supplanted by the instant whirr of the self-starter and hitting it 40 miles an hour within a few minutes after the call arrived.

Years ago the doctor with a large practise was usually worn out at the end of the day and an emergency call at night usually found him tired out, thus impairing his ability for further work that day or night. Today the comfort and seclusion which his automobile affords enables him to handle a greater number of patients with less exertion on his part. Thus his patients not only receive the benefits of quick and reliable service which the automobile renders, but it also enables the doctor to arrive with a clear, fresh mind, no matter what the arduous duties of the day may have been.

The architect, lawyer, contractor and business man in every line of business cannot only keep their office affairs running smoothly, but through the time saving ability of their automobiles, can get

out among their customers and clients. They find their home after a hard day one of the greatest stimulants they can indulge in.

This efficiency and economy of the automobile, which has enabled the business world to accomplish wonders and to maintain a rapid pace not dreamed of a short time ago, is also found in the owner's social and home life.

Take the family that owns an automobile. The hours and days formerly spent staying about the house are now being spent traveling in the country, breathing in the fresh air. Consider how the automobile has fitted in with the routine of the home. The tedious shopping and social calls made on foot or in crowded street cars are now turned into "health" trips in an automobile, accomplishing one and a hundred different duties that necessitate the housewife having to go to town or calling on neighbors. When friends are visiting, or everybody wants to do something, it is always the automobile that is first called into play, enabling every member of the family to enjoy the trip to their destination and to absorb health while on the way. The money it used for different amusements to keep everybody happy and their minds occupied, the many expensive trips to town that were made to get a change from home, can now be saved with greater enjoyment and more wholesome recreation at less expenditure.

The automobile has created more business in the retail life of every city and town than the average person realizes. Agricultural and suburban owners, who formerly either did without supplies and necessities, rather than to undertake a long and tedious journey to town, think nothing now of making the trip in their automobile. This adaptability has resulted in increased business in cities and towns, which in itself is beneficial to every inhabitant, because the more business a community does the greater is the prosperity of everybody concerned. In this way the automobile has been responsible for money being kept in

circulation.

Sitting behind the wheel of your automobile stimulates other activities. They say that "health is wealth." Ever notice how after an automobile ride you feel different? Your outlook on life is changed. It makes you want to enjoy the better things of life, and this desire creates added endeavors on your part. It arouses ambition. It makes you unconsciously work harder for your ideals. It makes you critical of the slow progress you are making. Such ideas and desires increase your efficiency, not only your business efficiency, but your personal efficiency.

If one considers the effect of the automobile on real estate values, one would be dumbfounded at what it has resulted in. With the increased use of the automobile it was readily apparent that good roads were a necessity. Laws were passed, assessments made and good roads became a reality, and with good roads came unusual realty values. Good roads attract people. Show me a city that is noted for its good roads and I will show you a municipality that is popular with motorists, and wherever motorists congregate you will find up-to-date stores, hotels and recreation centres that increase that community's standing as a business and social centre.

In a city's governmental activities the effect of the automobile is again apparent. It has revolutionized the protection of property. Most every fire department now has become motorized. It not only saves time, but saves life and property and is more economical to maintain than the horse drawn equipment. Again America is noted for its beautiful parks and driveways, which are the results of the efficient care the automobile has enabled the park commissioners and street departments to maintain at an upkeep within their appropriation.

"To be up and coming every day in the year is apt to be a strain on anybody, unless he can, without interruption, take proper care of his health. A man with an automobile can set a pace which the other fellow without the same means of transportation finds hard to follow.

"If you have a machine and your com-



Years Ago the Doctor with a Large Practise Was Worn Out at the End of the Day.

petitor has not, it is plain, common sense that you can cover more ground than he can, and consequently do more business in less time. As one business man expressed it: 'A man with an automobile rides to success and enjoys the trip.'

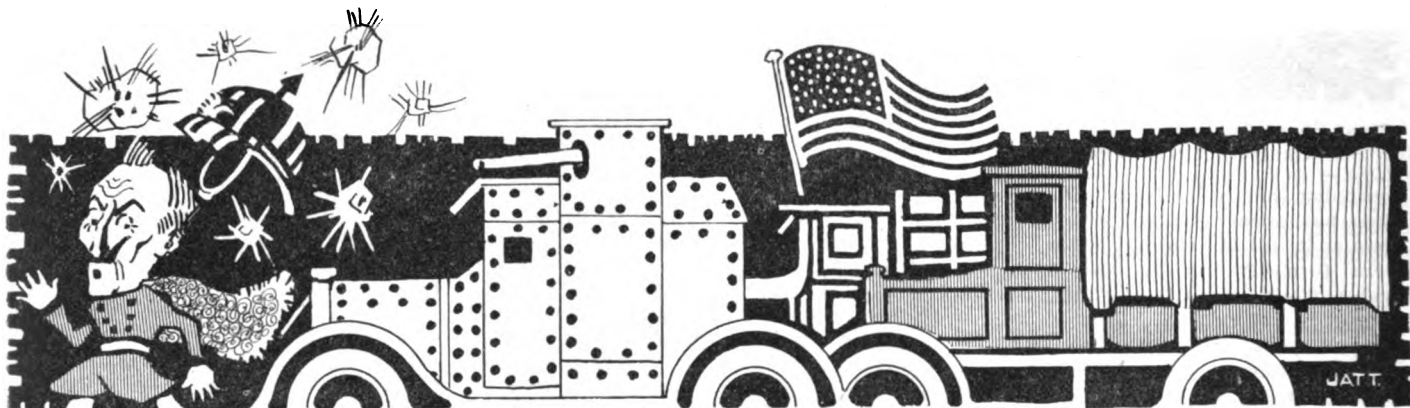
"While the automobile has been developed so that it is mechanically perfect and will give uninterrupted service, at the same time the manufacturers have made their product unusually comfortable, thus insuring to owners a physical let down or rest while traveling from point to point.

"The purchase of an automobile should be made as a business proposition. If you are in the manufacturing business and it is necessary for you to add more

equipment to keep up with the demand for your goods, there would be no hesitation on your part to make the investment.

"This undoubtedly is the reason why business men purchase automobiles. They are not only free from the petty annoyances and delays common with other means of travel, but arrive at their offices feeling in good trim after their drive down town and can make their appointments on time and in time. In other words, the owner's mind is alert and ready to grasp the business details that are awaiting his arrival. Driving an automobile gives a man the action necessary to offset the sluggishness of office physical inactivity."

In coming down to the present, when the whole world seems to be at war and when every patriotic American is doing his utmost for his country, here again is seen the dependability we place on the automobile. Visit any of the headquarters of the country's patriotic societies, go to Washington and note the government executives, senators, army and navy attaches, all working full tilt, going at a pace made necessary by the increased demands made upon their time. There is one thing that stands out forcibly and that is that practically without exception they depend on the automobile to convey them from point to point, saving time by annihilating distance, all for the purpose of helping win the war.



In Coming Down to the Present, When the Whole World Seems to Be at War and When Every Patriotic American is Doing His Utmost for His Country, Here Again Is Seen the Dependability We Place in the Automobile.

Keeping Highways Open With Motor Trucks

THE State of Connecticut has been a leader in the work of mobilizing its resources for the successful prosecution of America's part in the war. In many fields it has been a pioneer, until today Connecticut's example is watched for with interest, and followed by those who are in charge of the war work in other states.

One particular field in which this state has led most of the others is in the organization of its highways transportation system. As everyone knows she has for years been building up an excellent net work of state roads. This with other subsidiary and feed roads cover the state completely and bind together her numerous munition producing cities with their markets and shipping points along the Atlantic coast.

New England is served by one great railroad system. Until the European war broke out this railroad was sufficient. But with the war orders from abroad the output of the shops and mills and factories increased almost overnight to many times the normal amount and the railroad began to be smothered. The tie up of freight at terminals, caused by the lack of ships, added to the shippers' troubles. It was at this time of freight embargoes that the motor truck first came into its own as a practical agent for moving of freight. There are many factories in the New England states that were able to keep open at that time only

because they could bring in over the highways the raw materials that were necessary for them.

The crisis of the pre-war traffic congestion passed. For a time the conditions became almost normal and the railroad was able to hold its own against the manufacturers. But New England had learned her lesson and had come to realize the strategic importance of her highways. And so when the United States entered the war and the railroad again became swamped with more raw material and finished product than it could handle, Connecticut was ready. The state Council of Defense suggested legislation that has made of these highways arteries of commerce of the highest value, as a complement to the system of rail transportation. Laws have also been passed that have maintained the roads of the state at the highest efficiency despite a winter of unprecedented vigor.

The Council of Defense realized that the motor truck was the solution of the problem, and while practically every one else was spending their time talking about the possibilities of the motor truck they took steps to utilize it as such. The return system of truck transportation was instituted. By this system a Connecticut truck nowadays runs loaded both going and returning. This has been achieved by systematization of intercity trucks, by bureaus established

in the large cities of the state, under the auspices of the local Chamber of Commerce of War Bureaus. These bureaus keep on file a list of motor trucks available for local or intercity transportation. The shipper has only to consult one of these lists to obtain a return load for his truck. In this way the usual efficiency of the motor truck is increased 100 per cent.

The law requiring the Highway Commission to keep the state roads open at all times of the year has had the result of making possible shipments over the road of numerous supplies for our own and allied governments that could not possibly have been sent out by rail under the conditions existing this winter. It is of the greatest national importance that the great munition centre of America never lacks transportation facilities.

One of the most important stretches of highway is the Boston post road, running from New York through Bridgeport and New Haven. This stretch of road is under the care of R. M. Donnelly, commissioner of repairs. How well he has done his work may be known from the fact that despite heavy snow falls of December and January the state road has been continuous, open full width for every kind of service up to the heaviest hauling. Mr. Donnelly's supervision extends over 75 miles of state highway. The cleaning of such a stretch between sunset and sunrise is a big man's job.

To do this work of clearing Mr. Donnelly uses four motor trucks, which are equipped with adjustable snow plows. The two larger of these trucks are built in Bridgeport. The plow blades are of steel and are 10 feet long and 14 inches wide. They are hung on a semi-circular steel frame, which is operated from the seat of the truck by a hand wheel and heavy chains. With this arrangement it is possible to set the scraper blade to either a right or left hand angle, so the snow can be plowed either toward the centre of the street or toward the gutter. There is an automatic blade release so constructed that when the cutting edge strikes an obstacle such as a man-hole cover or car track the blade releases to pass over the obstacle and then immediately returns to its operating position.

In clearing the highways in the country two trucks are used in tandem formation and about a block apart to obviate the danger of absolutely blocking all traffic behind. The truck in the rear follows to the right or left of the forward truck, catching up the snow in its wake and throwing it and the snow untouched by the first truck, further to the side of the road. After the heaviest snow storm these trucks cover a minimum of 30 miles in a working day, clearing the road for a width of 18 feet and averaging from three to three and a half miles on a gallon of gasoline.

It has been proven that this method of clearing the state highways is a complete success and that it is the cheapest method yet discovered of dealing with the snow problem. It is predicted that in the near future many cities will use this method also. New York city has over 300 plows, but has to hire trucks to use with them. Philadelphia is better equipped, owing both to plows and trucks, and is not faced with the necessity of putting its snow clearing work out at contract. The great Lincoln highway, from Cleveland east, has been kept open this winter by the use of the same plow. It has been found that the larger trucks of high power are by far the most



Truck With Specially Designed Snow Plow Attachment Clearing Boston Post Road Between Bridgeport and New Haven.

efficient in this work.

It is surprising to learn what a large effect the hills have on the cost of this work. Near the city of Bridgeport, where the country is flat and hills are few, the cost is \$7.50 per mile. When operating on the hills in and near Greenwich the cost is between \$30 and \$40 per mile.

It is merely a question of how long it will be before the other states realize the national importance of their roads and follow Connecticut's lead in keeping them open to all sorts of weather. The railroad of the nation cannot handle the traffic that war makes necessary. The motor truck must do its share. In order that it may do it most efficiently the roads of the nation must be kept always in the best possible condition.

1918 I. H. C. ALMANAC IS ISSUED.

The 1918 issue of the International Harvester Almanac issued by the International Harvester Co. of America is being mailed to 2,500,000 farmers in the United States and 260,000 of the Canad-

ian edition are being sent to farmers living in the Dominion.

The book this year is more of an encyclopedia than an almanac. There are a few pages devoted to astronomical calculations, the area and depth of oceans, and such things, but for the most part it is a practical encyclopedia designed to give the farmer useful information. Such questions as how to figure the speeds of belts, how to make war bread, how to can by the cold pack method, how to find the horsepower of a tractor, how to select lubricating oil, how to figure the draft of plows or draw bar pull of tractors and how to grind valves are answered.

More than 150 subjects are discussed briefly and to the point. The cover of the almanac is printed in five colors and shows a delightful scene from a modern farm.

OBTAINING HIGHEST MILEAGE FROM GALLON OF GASOLINE.

When the average car owner begins to figure up the cost of car upkeep and his car mileage per gallon of gasoline, he seldom considers the amount of engine and car friction. That internal friction is a big factor in a gasoline engine is well known, and for this reason it is fitting that every automobile user should pay particular attention to his automobile lubricant. Many automobilists find that Dixon's graphite automobile lubricants answer the purpose of cutting down friction, and in addition make for cleaner engines because they are said to leave little or no carbon deposit. The little flakes of graphite are said to fill in all rough places in the metal and make a smooth surface.

A properly lubricated car lasts longer, gives more satisfaction and costs less for upkeep. The owner can take practically all worries from his mind as regards the car as he will seldom be obliged to do extensive repair work that is necessitated through lack or neglect of lubrication in the proper places.



Plow Blades Are 10 Feet Long and Are Controlled from Seat by Hand Wheel and Heavy Chains.

PLATE XVIII.

BRICK GARAGE FOR CITY OR COUNTRY ESTATE

Permanent Type of Construction Reduces the
Cost of Maintenance and Lowers Overhead Charges

Designed by the Architectural Department of The Automobile Journal Publishing Co.

OFTEN in deciding upon the type of garage required to meet the requirements of the private estate the owner overlooks the real essential points and points that make for ultimate economy, and bases his decision upon a desire to build at low first cost with the result that he ultimately is disappointed in his choice.

Considering the value of the car to be housed, convenience, saving in rentals and elimination of fire danger, it is necessary that a building be practically fireproof and of substantial construction. Taken over a period of 25 years, which is the minimum and not the maximum period of service of such a structure, the total expense per year, including all costs, would figure less than that on a building costing half as much to erect.

A garage of this type is shown in the accompanying plate and while representing a total outlay of \$1500 in its completed form with ordinary equipment, it affords a maximum of housing service with a minimum expense, taking into consideration the fact that it would be a substantial improvement upon any property where erected.

As shown by the plan the building is 18x18 feet, providing ample room for the largest sized car, as well as a work bench, wardrobe, sink and toilet. The exterior walls are of red brick, eight inches thick. The roof is built up of 2x6 inch spruce hip and jack rafters, covered with seven-eighths inch North Carolina pine matched boarding, which is thatched with asbestos shingles. All the exterior wood work is of white pine stock, including the crown mould, fascia, plancier, bed mould brackets and door and window frames.

The windows may be hung or hinged as desired. A small side door is located near the rear of the building on the side to provide means of entrance without handling the larger doors. A 12-inch granite lintel located over the main entrance supports the structure above and enhances the appearance of the front materially.

The main entrance has two swinging doors, each four feet wide and eight and a half feet in height, with a thickness of 2½ inches. The doors are made of white pine stock and fitted with Stanley garage hardware, made by the Stanley Works, New Britain, Conn. The equipment shown on the plate is known as Set A and is specially designed for brick, concrete or other construction requiring a large offset. It consists of

three pairs of hinges, equipped with ball bearings; one pair of door holders, top and bottom locking Cremone bolt with staples, extra heavy duplex latch, six-inch extra heavy padlock hasp.

The foundation wall is similarly constructed to those previously described in this series, except that it extends 12 inches above grade to form an underpinning for the structure. The concrete formulas for walls and cement floor are same as those previously given in these articles.

The depth and size of the foundation walls would be governed by the climate and locality where the building is to be erected. A width of 12 inches and depth of 42 inches are proportions to meet the average conditions, although where the soil or drainage conditions are not favorable a footing wider than the walls should be installed. In the vicinity of ground water a water proofing layer should be incorporated in the wall and floor, as ground water has a tendency to rise to the surface.

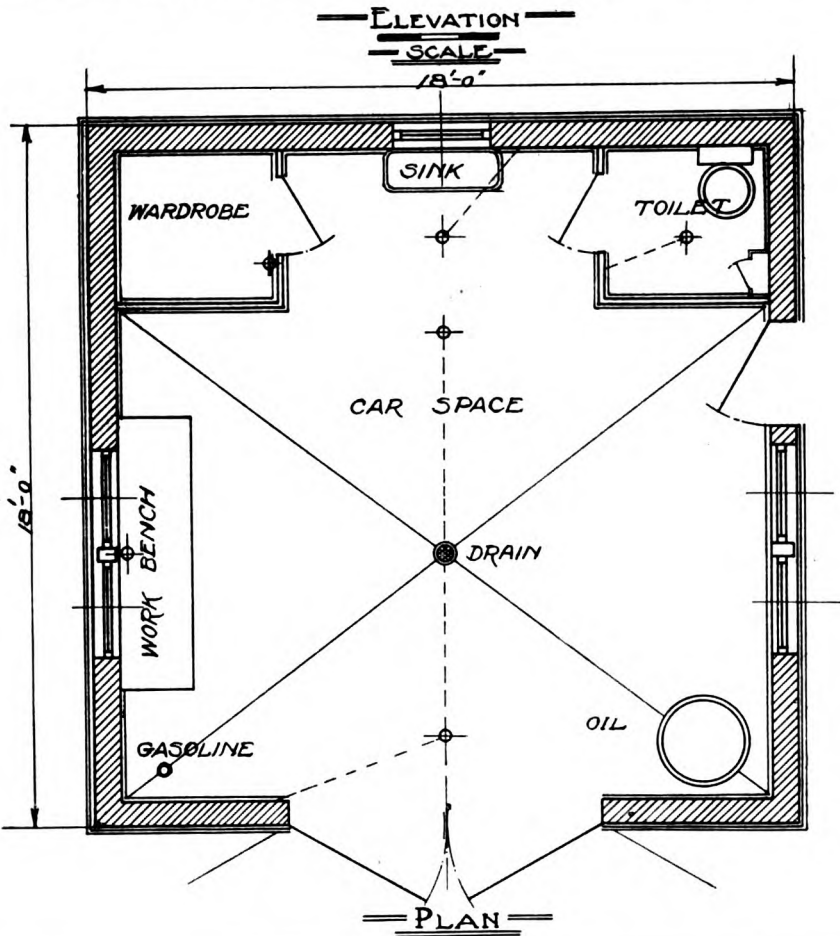
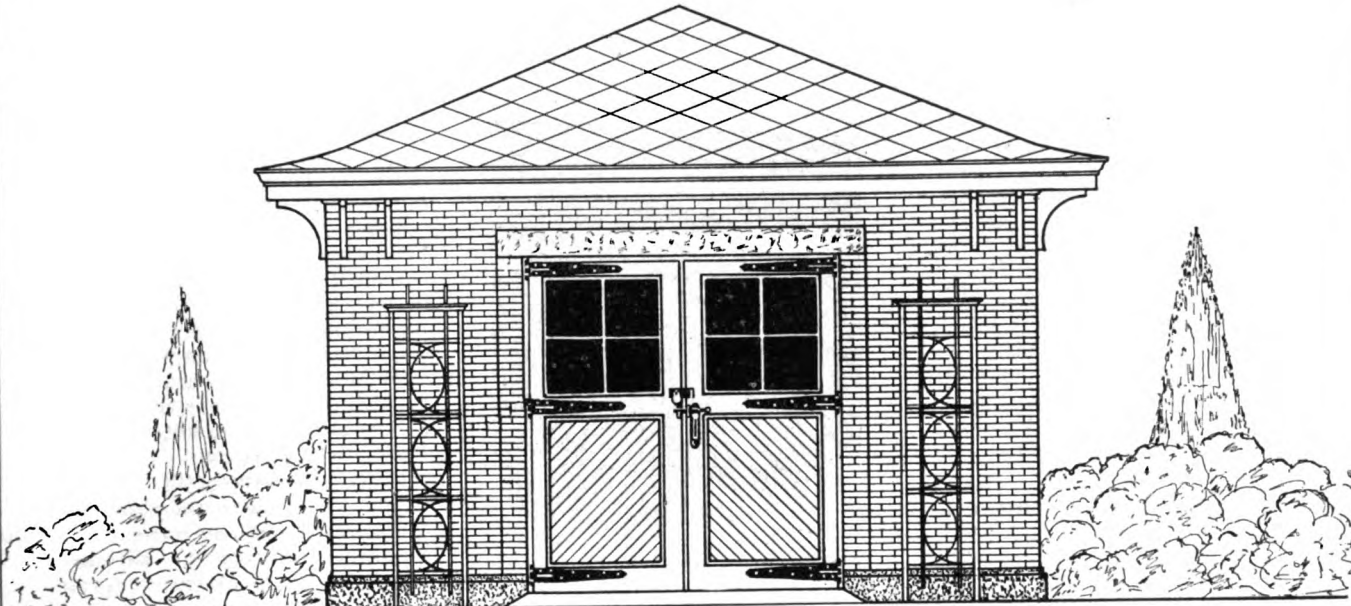
In laying the floor it is a good plan to cast it integral with the foundation and the cement finish should be carried up at least a foot on the walls so that there are no corners at the juncture of the wall and floor to collect dirt, grease or refuse. With the floor sloped toward the centre where the drain is installed, the garage can be flushed out clean with a hose.

As the floor is slightly above grade the approach will have a gentle slope. The approach should be made of concrete and scored off to give it a pavement effect. It may be left in the natural cement color to match the lintel or shingles, or can be made to match the bricks by using some red mineral pigment in the mixture.

A garage of this type should be connected with the house water system with both hot and cold water supply. An overhead washing device and other equipment should be installed to provide every convenience in caring for the car that is made possible through a well appointed garage.

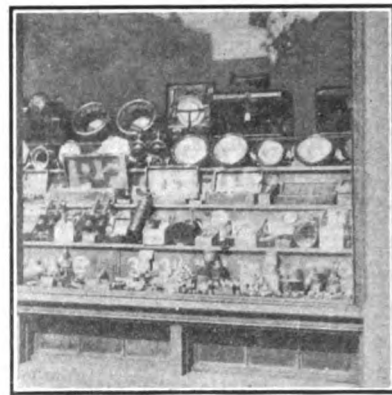
In heating this type of garage either steam or hot water systems are preferable and should be connected with the boilers in the house. The radiators are placed at the rear wall of the building, beneath the sink or at either side, so that when the car is driven up close between the partitions of the wardrobe and toilet the heat will be concentrated on the front end of the car, where it is most needed.

PLATE XVIII





Accessories Department



ATTACHABLE DOOR POCKET.

Among the needed accessories designed for the Ford and Chevrolet cars is the Martin Door Pocket. This pocket fastens over the door upholstery and is made of a high grade of leather cloth, which is warranted not to peel or crack. The pocket offers sufficient space for the carrying of route books, pamphlets, small tools, etc. With the limited space the advantages of this pocket may be readily seen.

Manufactured by the Martin Manufacturing Co., Inc., Lancaster, O. Price, \$1.



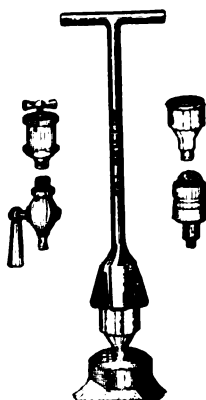
Martin Attachable Door Pocket.

UNIVERSAL GREASE CUP WRENCH.

It is common knowledge that one of the most annoying and dirtiest jobs about the automobile is the daily turning up of grease cups. Greasy hands, cuffs and coat sleeves often result, but it is a job that must be done, which no one dares neglect.

A tool which eliminates this annoyance has been placed on the market. The Universal Grease Cup Wrench is a great convenience in saving time, labor and temper. This tool fits all sizes and types of grease cups without adjusting. It may also be used for other various things about the car, such as turning hot or greasy primer cocks, pet cocks or drain cocks, and it will be found especially convenient for reaching cups and cocks in out of the way places.

Manufactured by the Prismolite Co., Columbus, O. Price, 50 cents.



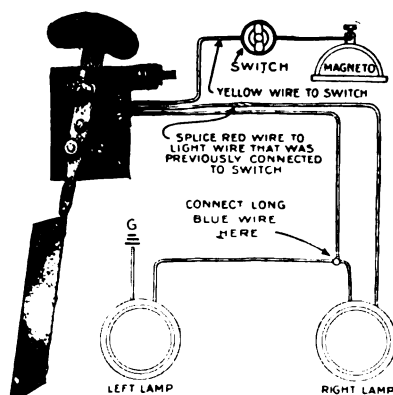
Universal Grease Cup Wrench.

AUTOMATIC HEAD LIGHT CONTROL.

The New York automatic head light controller for Ford cars is a device that should be of interest to every Ford owner who is troubled with the varying light given by his car headlights.

Every Ford owner knows that when his engine is running slowly the lights do not furnish sufficient illumination. On the other hand, if the engine speeds up or races there is danger that the bulbs will be destroyed by the excessive current.

Briefly stated, the New York Automatic Head Light Controller consists of an arm which is attached by means of a stud to the base of the device. To the lower end of the swinging arm is at-



New York Headlight Control.

tached an aluminum disc, which when in position on the engine is about eight inches back of the fan. The base is fitted with three contacts over which the swinging arm travels.

When the engine is started the arm by spring tension is brought to the first contact and only the left head light receives current. The total current from the magneto is sufficient to illumine this single head light to its full candle power.

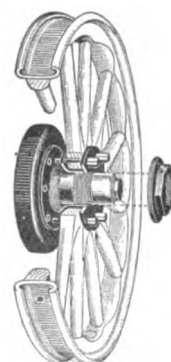
As the engine speeds up the air current, acting on the swinging arm disc, carries it to the second contact and both bulbs receive current. Should the engine speed increase still further the arm would contact with the third connection and a resistance coil introduced into the circuit, preventing the burning out of the lights from excessive current.

Manufactured by New York Coil Co., 338 Pearl St., New York, N. Y. Price \$5 complete with wiring.

"MINUTE" DEMOUNTABLE WHEELS.

With these wheels, which are made for Ford cars, the shoe can be shifted in 60 seconds by simply removing one large nut. The outfit consists of four wheels with one extra wheel interchangeable with any of the four. The change can be made with little effort or the soiling of hands or clothes. They have less weight than demountable rims and a better balance, for the bulk of the weight is on the hub instead of the rim. Four hubs, a wrench and one extra flange accompany the outfit.

Manufactured by the Hills-Smith Metal Goods Co., Boston, Mass. Price \$30.



Minute Demountable Wheel.



Apco Ford Oil Gauge.

NEW FORD OIL GAUGE.

A clever device for Ford cars that has been recently placed upon the market by a well known firm manufacturing Ford accessories, is an oil gauge that is designed to meet the objections of those people who think there is danger of a stone flying up and breaking the glass in the old style oil gauge. It consists of a metal chamber containing a float to which is attached a rod with a white ball on the end. The distance between the ball and the top of the chamber show the amount of oil in the crank case. Unlike the other style the oil level can be seen at night and dirt cannot obstruct the view. Installing is an easy matter by simply removing the lower pet cock, screwing the gauge into its place and rescrewing the pet cock into the gauge. This device is made of malleable iron, finished in black enamel and nickel with a white ball, all weighing 10 ounces.

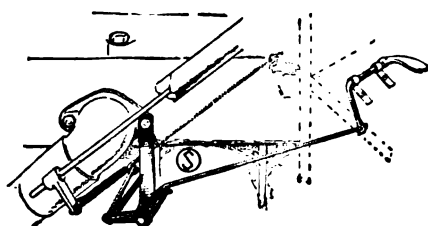
Manufactured by the Apco Co., Providence, R. I. Price, 60 cents.

STEWART FOOT ACCELERATOR.

Unquestionably a foot controlled throttle, or accelerator, is great convenience and there are few cars now on the market not fitted with such a device. The Ford happens to be among the few.

The Stewart Foot Accelerator is designed for the Ford car and can be applied with a minimum amount of work. This device is extremely simple to apply and requires no alterations in the present machine, except the boring of a three-quarter inch hole for admitting the foot lever. The accelerator is so designed that it may be placed in any convenient place on the floor boards or dash and with the exception of the pedal all parts are located out of sight beneath the hood.

Manufactured by F. W. Stewart, 1402 Michigan Ave., Chicago, Ill. Write for prices.



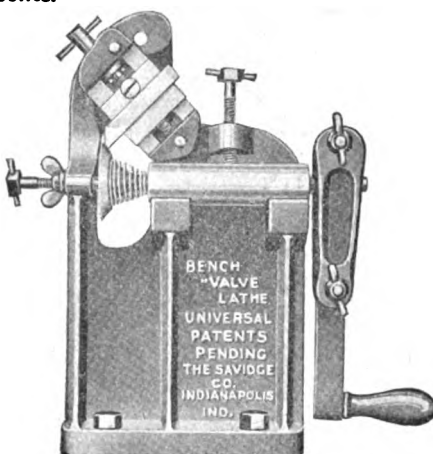
Stewart Foot Accelerator.

UNIVERSAL VALVE LATHE.

Excessive heat generated in a gasoline motor quickly warps the valve head, result of which is poor compression and faulty ignition.

The Universal Valve Lathe makes it possible to give the motor proper valve attention. It is indispensable in the garage and is light, compact and cuts quickly and easily. It can be clamped in a vise or held in one hand and operated with the other. One does not have to be a machinist to operate this lathe. While it is made for any size valve the two steel sleeves furnished, one for 5/16 valve stem and one for 3/8 sizes will handle 90% of the valves on the market. Each lathe is fitted with a high speed steel cutter ground ready for use.

Manufactured by the Savidge Co., Indianapolis, Ind. Price, \$10. Extra sleeves, 75 cents. Extra cutters, 75 cents.



Universal Valve Lathe.

PECK'S SUPER HEAT.

One of the great troubles with present day fuel is the high vaporizing point. At atmospheric temperature, high vaporizing point gasoline is carried into the engine in the form of a wet mixture, which has comparatively low explosive power.

The Peck's Super Heat Manifold is designed for Ford cars, and consists of a single casting of gray iron with the intake and exhaust passages integral. The passages are so arranged that all of the exhaust gases pass over one wall of the intake passage and, in operation, the heated walls vaporize the incoming mixture and turn it from a wet to a dry gas.

Manufactured by Peck's Super Heat Co., Elkhart, Ind. Price, \$7.50.

NEW STYLE TOOL HOLDER.

In getting out their new style "O O" Tool Holder, the manufacturers have considered particularly the requirements of users of bench and watch lathes and for the first time the correct size of holder required in these lathes can be secured.

The tool holder is a fine quality of drop forging broached with a perfectly square and true hole for the cutter.

The cutter is furnished in the finest grade of high speed steel treated by the

Taylor-White process. Both of these tools are nicely finished and sent complete with a 3/16 inch square cutter and wrench. The holder size is 5/16x3/4x3 1/2 inches.

Manufactured by the Ready Tool Co., Bridgeport, Conn. Write for prices.



New Style Tool Holder.

OREM MOTOR PROTECTOR.

Upon practically all tractors and many trucks the carburetors are fitted with devices for filtering the entering air to prevent foreign particles, dust and dirt from passing into the cylinders.

Every autoist makes a point of filtering the gasoline and keeping the cylinder oil clean, yet fails to realize the amount of dirt entering the engine through the air intake. This dirt soon leads to carbon formation, and excessive cylinder and bearing wear. The Orem Motor Protector is a device which is designed to prevent all dirt from entering the carburetor.

This device consists of a heavy wire mesh cone upon which is placed a pressed felt, filter material, having an area of 84 square inches. The whole is enclosed in sheet metal and fitted with air intake and carburetor attachment. The manufacturers claim that there is no noticeable restriction of intake air when this device is used, and that the felt surface is, in a measure, self cleaning, for the vibration of the machine shakes off the dust into a dust collecting ring at the bottom of the device.

Manufactured by the Orem Motor Protector Co., 208 Maryland Trust building, Baltimore, Md. Write for price.



The Orem Air Filter.



NU-RA-LENS.

Headlight glare, a factor that is being legislated against in most of the states, constitutes a danger which causes as many accidents to the machine fitted with glaring lights as to other machines on the highways. The Nu-Ra-Lens is an attractive headlight glass, which is designed to prevent direct ray action with the attendant glare. This type of lens is mosaic in effect, with its surface broken into many small prisms, which deflect the light, but do not dim it. In this way all of the light from the bulb is thrown in front of the machine, but not in the form of direct rays.

The manufacturers claim that though a perfectly white and clear light is projected, it possesses none of the objectional glare common to clear glass lenses. The illustration shows the general appearance of this lens, which is perfectly smooth upon the outside, the prismatic effect being obtained by projections upon the inside of the glass.

Manufactured by the Nu-Ra-Lens Co., 54 N. Fourth St., Columbus, O. Prices from \$2 to \$3 according to size.

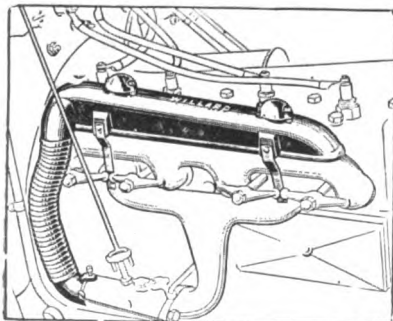
WILLARD SUPERHEATER.

During the cold weather many motorists find that their engines are not so efficient as they were in the summer months. This is usually due to the fact that gasoline does not vaporize readily in cold air.

The Willard Superheater is a device designed to eliminate the cold air trouble and to furnish a supply of hot air to the carburetor intake. It consists of a large hot air stove which is clamped upon the exhaust manifold, and a length of flexible metal tube which carries the warm air into the carburetor.

The device may be installed on any Ford car having a standard Ford carburetor, and requires the drilling of no holes or change in the Ford car.

Manufactured by the Willard Co., South Bend, Ind. Price, \$5.



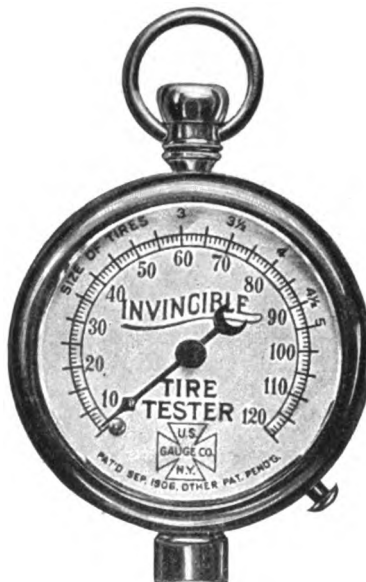
Willard Superheater.

INVINCIBLE TIRE TESTER.

Not every motorist realizes that in many cases one-fifth of his car value is in the tires. This being the fact, more time should be spent and care exercised in keeping the tires in condition. Air pressure is a big factor in tire life and every motorist should make a periodic test of the tires to be sure that they are properly inflated.

The Invincible Tire Pressure Tester is an ingenious device, which may be carried in the vest pocket like a watch or in a tin box, which is furnished, in the tool box. The crystal is made of so-called, unbreakable composition, which is transparent. The dial is graduated to indicate from zero to 120 pounds pressure. In addition to the pounds pressure markings, a second series of numbers indicates the pressures required for different sized tires.

Manufactured by United States Gauge Co., New York, N. Y. Price, \$1.25.



Invincible Tire Tester.

EVER GOOD ELECTRIC PRIMER.

The difficulty in starting an engine in cold weather usually can be traced to the condensation of gasoline on the manifold, or may be due to the fact that the gasoline does not vaporize. The application of heat to the manifold is an efficient means of vaporizing the gas, as every motorist who has poured hot water over the manifold knows.

A handy electric device, known as the Ever Good Electric Primer, consists of a gasket, which may be placed between the manifold and carburetor. Around the inside rim is coiled a German silver wire, each end of which is connected through a switch with the battery. When the switch is closed current passes through the coil in the manifold, heating it. The heat is transferred to the manifold and carburetor, vaporizing the gasoline for starting.

Distributed by Emil Grossman Manufacturing Corp., Bush Terminal Factory 20, New York City. Write for prices, stating make of car.



F-W-S SWIVEL JOINT.

But few people realize the strain to which the speedometer swivel joint is put. This joint is usually located out of the way and receives but scant attention and has to stand tremendous speeds, usually rotating two or three times faster than the engine crankshaft. To withstand this extreme strain and rapid rotation the F-W-S Swivel Joint has been designed.

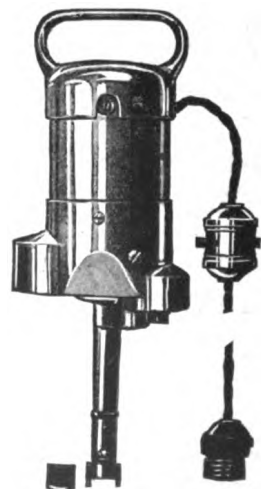
The F-W-S joint is designed primarily for strength. The four steel gears are of one-piece construction, that is, each gear and its respective shaft is turned from one piece of stock, thus eliminating trouble from gears loosening on the shaft.

Manufactured by F. W. Stewart, 1402 Michigan Ave., Chicago, Ill. Price, \$2.50.

STENMAN VALVE GRINDER.

This new machine, recently placed upon the market, is designed to save labor in valve grinding, and it will handle truck, tractor, aeroplane, marine or stationary internal combustion engine valves. This machine will operate from either direct or alternating current and also can be operated from any standard lighting circuit. Any valve can be reground in either the L. T. or I head construction, and the valve seat renewed in from three to five minutes as compared with from 15 to 20 minutes required with hand tools. Doing accurate work this machine has met with remarkable success, for it is now being used by the government at Camp Devens, at various aviation fields, by such concerns as the United States Steel Co., the Western Electric and Standard Oil companies and numerous garages throughout New England and New York states. It is thoroughly practical for any size establishment.

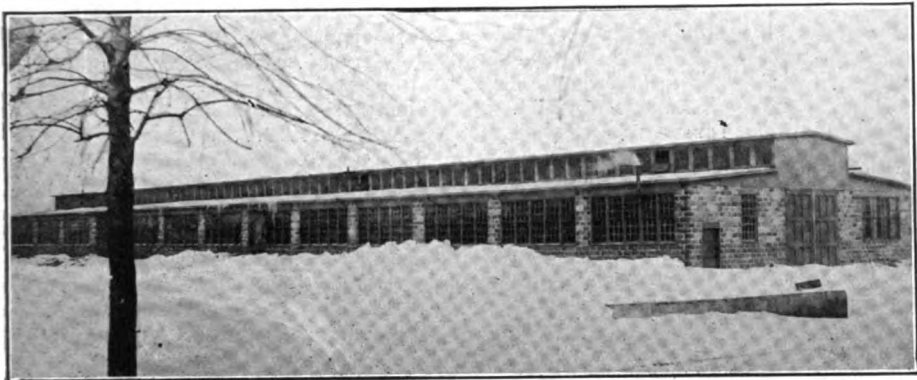
Manufactured by the Stenman Electric Valve Grinder Co., Inc., 42 Southbridge St., Worcester, Mass.



Stenman Electric Valve Grinder.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration



Factory Unit for the Indiana Truck Corporation's Plant at Marlon, Ind., Built in Two Weeks After Signing the Contract—A Record Accomplishment.

The Peerless Truck and Motor Corporation gained in sales \$5,399,428, and the net earnings in 1917 were equal to 10.50 per cent. on the common stock. This contrasts with 20.35 per cent. earned in 1916. Frederick Gilbert, president, attributes this drop to increased operating costs, Federal taxes and greater depreciation allowances.

Sales in 1917 totaled \$18,924,451, exclusive of munitions business and special General Vehicle Company contracts. Net income from sales was \$1,302,618 in 1917, compared with \$2,504,759 in 1916. Net profit for the year after \$306,799 allowed for Federal taxes, amounted to \$949,483, compared with \$1,358,810, the net profits in 1916.

The balance sheet shows \$2,869,569 cash in banks, with inventories of \$5,318,743. Accounts and notes receivable total \$2,098,204.

The income statement follows:

	1917	1916
Net sales.....	\$18,924,451.88	\$13,525,024
Expenses	17,329,984.87	11,020,265
Depreciation....	291,848.68	311,554
Net income		
from sales...	1,302,618.33	2,504,759
Other income..	405,013.44	154,233
Total income...	1,707,631.77	2,658,992
Depreciation in investments..	34,962.51	28,703
Profits and income tax (estimated).....	306,799.39	
Total deductions	641,761.90	623,932
Balance.....	1,065,869.87	2,035,060
Contingency reserve	116,386.60	72,567
Net profit for year	949,483.27	1,358,810

"In common with other industries your subsidiaries had to contend with rapidly rising costs and disturbed conditions of transportation, and will also be called upon to bear their proportion of increased taxation," says President Gilbert. "The net profit for the year carried to the consolidated balance sheet, after payment of interest on \$5,000,000

of notes of your corporation and also after deducting liberal depreciation and the sum of \$306,799 for estimated Federal taxes amounted to \$949,483. A decrease of \$409,327.

"During December, 1917, the plant of the General Vehicle Co., Inc., at Long Island City was sold to the United States government with the exception of the electric truck business and certain other items. As a result of this transaction your corporation has invited tenders for such an amount of its 10-year six per cent. secured convertible gold notes as can be purchased for the sum of \$750,000. Tenders will be received by the Bankers Trust Co., 14 Wall street, New York City, at or before 3 o'clock p. m. on March 18, 1918.

"The success of the eight-cylinder car continued throughout the year 1917 with orders in excess of production. The shipments in 1917 were more than double those in 1916, showing that the effort of the company to produce a well designed car of high power and econom-

ical operation has met with favor by the public."

The Jones Motor Car Co., Wichita, Kan., have announced an increase in the price of Jones passenger cars, which will become effective on March 15.

Model	New Price	Old Price
Seven-passenger touring (26 B—Lewis motor).....	\$1775	\$1675
Four-passenger practical roadster (26 A—Lewis motor)	1775	1675
Four-passenger sport type (26 C—Lewis motor)....	1775	1675
Seven-passenger touring (27 B—Continental motor)	1875	1675
Four-passenger practical roadster (27 A—Continental motor).....	1875	1675
Four-passenger sport type 27 C—Continental motor)	1875	1675

It is expected that quantity production of a line of one and two-ton trucks will be started within a few weeks. These will also use a Continental power plant.

The Buda Co., Harvey Ill., is erecting another new building to meet the needs of the company's rapidly expanding business. This structure is four stories high, of reinforced concrete construction with brick walls.

The Ross Gear and Tool Co., Lafayette, Ind., have issued a new and complete catalogue. The book is beautifully gotten up and profusely illustrated, showing the line of products in detail.

The Hewett Rubber Co., Buffalo, N. Y., has increased its capital stock from \$1,500,000 to \$3,000,000. Early last summer the company increased its capital from \$1,000,000 to the point which has now proved insufficient to the needs of the scale on which the company desires to operate.



Main Plant of the Ahlberg Bearing Co., Chicago, Which Now Has 12 Branches for the Exchange of "Remade" and the Sale of New Bearings.

The Clum Manufacturing Co., Milwaukee, Wis., manufacturing motor car and electrical specialties, stampings, has increased its capital stock from \$10,000 to \$100,000 to accommodate its increased business and provide for expansion. The plant is located at 23-27 Erie street and Arthur Denniston is president.

The Reliance Motor Truck Co., Appleton, Wis., formerly the Racine Motor Truck Co., Racine, Wis., has broken ground for the first unit of its new motor truck manufacturing plant, to be 75 by 300 feet in size, of brick, steel and concrete construction, one story high. The building will cost \$30,000 and the equipment an additional \$25,000.

The H. B. Shontz Co., New York City, has appointed as official service stations for the U. S. L. batteries the following: The Middletown Storage Battery Co., Middletown, N. Y.; E. Favre, New Rochelle, New York; John Van Bens-

ganized by George C. Kincannon, designer and patentee of an improved gearset for motor driven vehicles.

The Bourne Magnetic Truck Co., New York, has moved its factory and offices to Fifth avenue and 142nd street.

The Guaranty Securities Corporation held its annual meeting recently and the following directors were added to the board for the three-year term: H. Mercer Walker, W. B. Joyce, William M. Ramsay, E. S. Maddock, Paul Fitzpatrick. The other directors were re-elected. Official changes were the promotion to vice presidents of Burt McDonald, in charge of the corporation's Canadian office, and H. L. Wynegar, vice president of the Guaranty Banking Corporation of Chicago. F. A. Franklin was elected treasurer and assistant secretary. The Guaranty Securities Corporation is now located at 244 Madison avenue, having moved from the Equitable building.

Berline, with wire wheels (optional) 1275
Sedan with wire wheels..... 1275
Chassis with cowl..... 735
Chassis with commercial delivery
body 810

Trucks.

1-ton truck chassis.....\$1085
1-ton truck chassis with cab and
windshield 1125
1-ton truck chassis with stake gate 1180
1-ton truck chassis with combina-
tion box stake..... 1175
1-ton truck chassis with combina-
tion box 1135
1-ton truck chassis with canopy
body 1195

The prices for Canada and foreign countries will remain the same.

The National Motor Car and Vehicle Corporation, Indianapolis, Ind., has increased the prices of all models except the convertible sedan. The new prices are as follows: Six-cylinder, seven-passenger touring, four-passenger roadster and phaeton, \$2150; sedan, \$2820. Twelve-cylinder, seven-passenger touring, four-passenger roadster and phaeton, \$2750; two-passenger dispatch roadster, \$2850; sedan, \$3420.

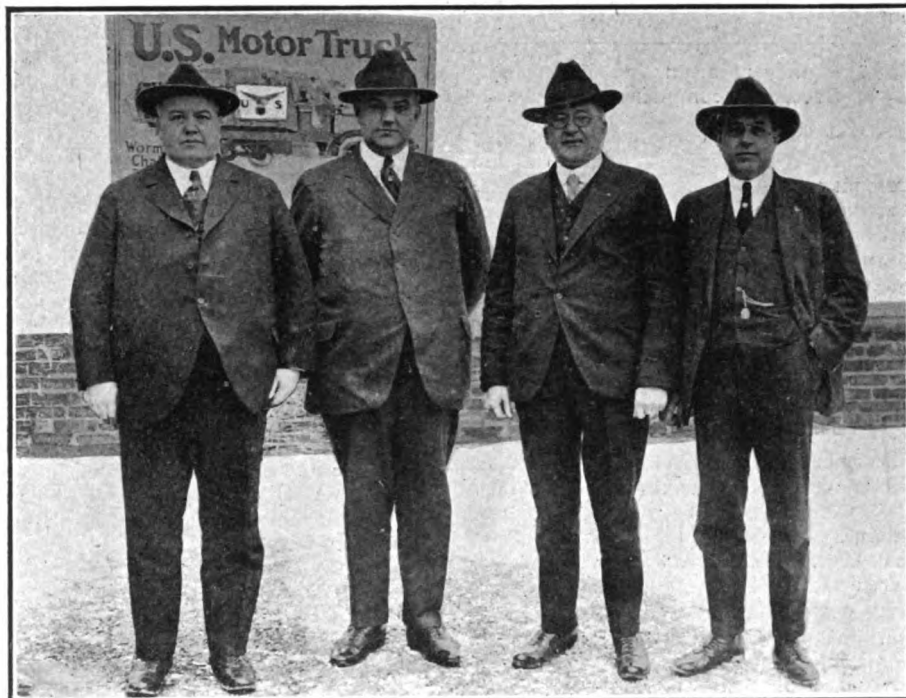
The B. F. Goodrich Company for the year ended Dec. 31 shows earnings equal to 14.4 per cent. on the 60,000,000 common stock, which compares with 12.76 per cent. earned for 1916. The surplus carried forward after all deductions was \$5,257,490. Among the deductions is \$1,092,000 for depreciation and \$2,250,000 for war taxes. Following are the comparative operations for the year ended Dec. 31:

	1917.	1916.
Net sales.....	\$87,155,072	\$70,990,782
Expenses	71,934,795	60,375,872
Total income..	\$15,220,277	\$10,614,910
Depreciation	\$1,092,456	\$890,164
Int. on B. P.....	1,333,144	155,982
War taxes.....	2,250,000	.....
Pref. dividends..	1,848,000	1,911,000
Totals	\$6,523,600	\$2,957,146
Balance	\$8,696,677	\$7,657,764
Com. dividends..	\$2,400,000	2,400,000
Other deductions.	1,039,187	921,465

Surplus \$5,257,490 \$4,336,299
Pr. and loss surp. \$20,177,378 \$14,919,888

The Turner Manufacturing Co., Port Washington, Wis., recently increased its capital stock from \$150,000 to \$250,000, and will devote much of the new issue to the expansion of its tractor department. A production of from 400 to 500 tractors is planned for 1918. Dealers in the United States and Canada have contracted for a large part of the output of both tractors and engines.

The Western Carburetor Co., Alma, Mich., has elected the following officers: President, Albert Fevert; vice president, George J. Sandel; secretary, Harley Williams; treasurer, Charles O. Ward. The present output is 30 carburetors a day, but when the plant's equipment is manned properly with efficient workmen and mechanics it will have a capacity of 200 carburetors a day.



A Half-Ton of Truck Salesmen: This Heavy Duty Quartette Consists of Sales Manager Forrest J. Alvin, Vice President Robert S. Stewart, Western Sales Manager W. B. Cochrane and District Sales Manager P. D. Sampsell of the United States Motor Truck Co.

choten, Poughkeepsie, New York; the Douglas Brothers Co., 440 Hawley avenue, Bridgeport, Conn.; Fred Stanwise, Evergreen, L. I.

The Goodyear Tire and Rubber Co., Akron, O., is placing on the market a new type of cushion tire. The tire has been in preparation for more than two years and in cross section somewhat resembles an inverted Y, having a fabric reinforced double base fitting a clincher-flanged rim. The tread has a practical wearing thickness equal to that of similar size tires.

The Kincannon Silent Transmission Co., Boscobel, Wis., has elected the following officers: President, George C. Kincannon; vice president, Peter Boebel; secretary, Roy Greenfield; treasurer, Richard Black, and director, Dr. C. L. Jones. The company was recently or-

The Pierce-Arrow Company will soon issue its annual report. Earnings for the year are estimated at about \$12 a share for the stock after all deductions, comparing with \$13.08 in 1916 and \$14.20 in 1915.

The Swan & Finch Co., New York City, recently celebrated its 65th anniversary. In 1853 the business first started in a small building on Water street.

The Maxwell Motor Sales Corporation, Detroit, Mich., has increased the price on all passenger car models \$80; on all truck models \$100. The prices are as follows:

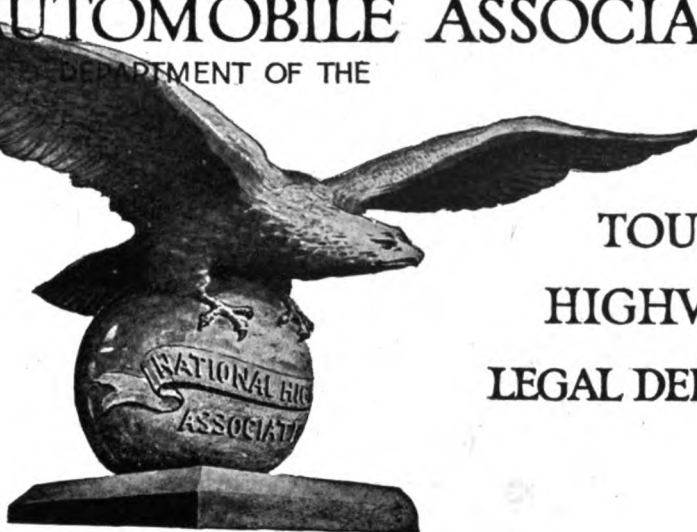
Model	New Price
Touring car.....	\$825
Roadster	825
Touring car with winter top.....	935
Roadster car with winter top.....	910
Berline (6-passenger town car)....	1175

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Many Novel Traffic Reforms In New York

Dr. J. A. Harriss, New Special Deputy Police Commissioner
for Traffic Proposes Numerous Innovations in the System

MOTORISTS of New York City, where the traffic problem has presented a condition which the officials have labored in vain to remedy, are looking forward with confidence to an early relief from many evils that make the operation of a car in that city difficult and dangerous.

Both the motorists and the city officials are basing their expectations on the reforms to be inaugurated by Dr. John A. Harriss, the newly appointed special deputy police commissioner for traffic. That these hopes are well founded would be indicated by the fact that Dr. Harriss is not only an automobile enthusiast, but has toured extensively throughout the United States and in Europe and has also had business experience that brought him in touch with affairs of magnitude. It is also a noteworthy fact that he is serving the city purely from a motive of civic pride, as he has accepted the appointment without salary.

He has not approached the traffic problem with the attitude that it is to be solved by legislating against the motorist, but with the conviction that the most will be accomplished through a spirit of cooperation; not alone, however, among the motorists, but among the city administration, citizens and business men. He also contends that officials in the large European cities have been more progressive in handling traffic problems and that in this country development along these lines has been comparatively slow.

As a means of relieving the congestion

of traffic resulting from the gathering of large numbers of automobiles about theatres at closing time, Dr. Harriss has a number of suggestions. First, he suggests that the closing time in the various theatres should be varied just a few minutes so that one crowd gets on its way home before another is emptied into the thoroughfares. He also advocates a new rule which would provide that those who arrive earliest shall have the vehicles call for them first and the conveyances will be called to the theatre entrances in series of 10, first 10 private cars and then 10 taxicabs, thus alternating until all those using conveyances have been accommodated.

A new card system as a means of increasing the efficiency of the traffic regulation and to reduce the number of arrests has been planned. Every operator of a car will carry a card if the plan is put into execution and this card will be punched instead of an arrest being made or summons issued in cases where the law violation is not a serious one. The traffic officer when he apprehends a man driving a little faster than the law permits, or on the wrong side of the street, or with a smoking exhaust, punches his card and a record of the offense is also made at headquarters. There is another card at the traffic court, so the record is made in triplicate. When a man is stopped for a violation of the traffic regulations and the traffic officer finds that his card has been punched four times, a summons is issued. A number of advantages are claimed for this system.

It not only makes a driver cautious who has already violated the law in some respect, but gives a first offender an opportunity to escape prosecution and mend his ways. Persons who have violated the law four times would be very careful not to be apprehended again, as it might mean the loss of their license and they could not contend that they were the victims of persecution by any one officer, as their offenses would probably be recorded by several different traffic officers.

Much of the time now spent by traffic officers in the courts testifying against operators for minor offenses would be saved, while in cases where flagrant violations were being persecuted the state would have a better case against the defendant. With this system it would not take long for the authorities to determine who the drivers were that were a menace to the community and to see that they could no longer endanger the lives of pedestrians or motorists.

The construction of a motor driveway from 40th to 59th streets, in Sixth avenue, is advocated by Dr. Harriss as a means of relieving the congestion of traffic flowing up and down town in that section. He suggests that beneath the driveway there could be a lighted arcade, well ventilated by the openings at the cross streets, and the stores along the streets would also be benefited, as a sidewalk could be constructed on the upper levels, giving the buildings two street floor levels, accessible to either pedestrians or people in vehicles.

New Laws and Interesting Legal Decisions

Crossing Signs

At a conference in Hartford between members of the public utilities commission and Connecticut Motor Vehicle Commissioner and Highway Commissioner Charles J. Bennett, it was decided, on the suggestion of Commissioner Stoeckel that leaflets be distributed throughout the state informing the people of the meaning of signs to be erected at railway crossings under the last session of the General Assembly of that state.

Previously the conferences discussed the warning signs. They will consist of a metal disc 24 inches in diameter, the field to be white with a black border line, one inch wide, with black perpendicular and horizontal lines two and one-half inches wide and each of the upper quarterings the letter "R" five inches high and three and three-quarter inches wide. These signs are to be placed in conspicuous positions beside the highway at a distance of not less than 300 feet nor more than 500 feet from the nearest rail of the crossing.

The public utilities commission was empowered to determine the crossings at which motor cars should come to a stop under the new law. The commission has made an investigation and has decided on a list of crossings throughout the state. It is on file at the office of the commission.

The commission has decided to erect other signs in addition to the warning, some of which will be illuminated at night. When the color displayed is red it will be a warning that a train is approaching. At crossings which are protected only a part of the day by a flagman or gateman, the sign will read "Stop." The flagman or gateman is off duty. There will be also audible and visible signals that a train is approaching.

GARAGE OWNERS FAIL TO CHANGE SYSTEM.

At the meeting of the Garage Owners' Association in New York, when the question of eliminating the payment of commissions to chauffeurs came up for discussion, the meeting resolved itself into a stormy session, in which Morris Segall, proprietor of the Commercial Garage, who has been a leader in the agitation, resigned from the organization. While admitting that such a condition exists in the garages, the drivers say they accept the 10 per cent. commission with the full consent of their employers, because it is absolutely necessary for them to do much tipping in the garages in order to get service, and that these tips amount to more than the commission received. Mr. Segall declared that the fight to eliminate the graft evil will be continued by himself and several of his business colleagues.

Motorists Catechism

By Magistrate House.

Do you stop when street cars stop ahead of you?
Do you ever have your speedometer tested?
Do you ever stop to look at your rear light?
Do you drive in wet weather without chains?
Do you test your brakes before driving your car?
Do you know what makes an automobile smoke?
Do you talk to persons in your car while driving?
Do you know the rules of the road?
Do you order the chauffeur of your motor truck to operate it without proper equipment?
Do you order a taxicab driver to break the speed law on a 50-cent trip and then let him pay a \$50 fine?
Be a careful owner or driver and avoid trouble and inconvenience.

REGISTRATION PLATES BY PARCEL POST.

A bill introduced in the Massachusetts Legislature requiring the highway commission to send number plates to automobile owners by parcel post instead of by express, was strongly urged for adoption by legislators from all parts of the state during a hearing on the measure before the Committee on Roads and Bridges.

Ernest La Rocque of Fall River, who filed the measure, claimed that there was not only delay in delivery under the present system, but that the expense to the owners was over 100 per cent. greater than if the plates were sent by parcel post.

RATIO OF AUTOMOBILE ACCIDENTS DECREASING.

As the result of a careful study of the police department records of automobile accidents in New York City, the department of health finds that the number of deaths caused by automobiles in the city has decreased from 8.32 per 1000 cars registered in the state in 1902 to only 1.28 per 1000 in 1916.

"If the ratio of deaths from automobile accidents to automobiles operated that prevailed in 1908 had prevailed in 1916, over 1600 persons would have been killed," says Dr. S. W. Winne, assistant registrar of the department of health, "and if we assume that the ratio of deaths to accidents remains fairly constant year after year, about 30,000 persons would have been injured instead of 7500.

"The death rate of automobile accidents is not the result of increased carelessness, but rather the result of the increased number of automobiles operated in the city.

An Unusual Case

That the question of speed limitations on country roads should be largely regulated by conditions and circumstances has long been the belief among experienced and well posted justices and manifestly the intention of the law, in this respect, is really being carried out more sincerely when the operator is driving carefully than when he is merely observing a speed limit, owing to fear of prosecution.

A most important decision bearing on this phase of motor car regulation was made a few days ago in the court of special sessions at Hempstead, L. I., by Justice Walter R. Jones. The case under consideration involved a charge of speeding, brought against J. Emlen Roosevelt of Sayville, L. I., who was found not guilty.

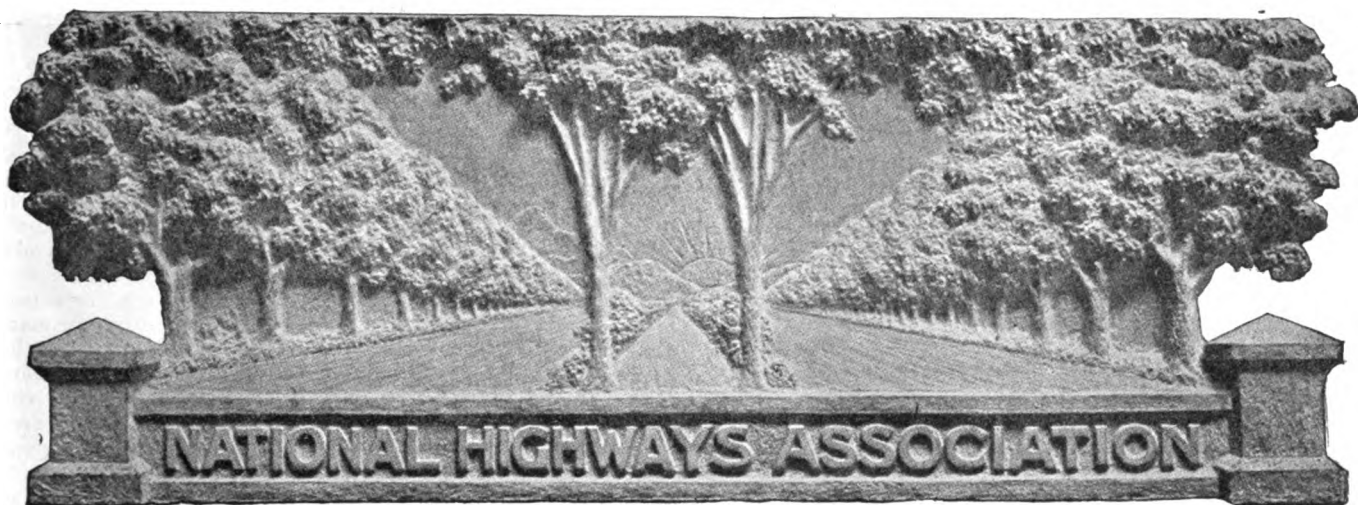
The justice decided that it was up to the prosecution in such cases to prove reckless driving before such a charge could hold and did not support the general belief that driving at a speed in excess of 30 miles an hour in New York state is presumptive or prima facie evidence of reckless driving.

Mr. Roosevelt was driving from New York city to his country place on Jan. 12, when he was stopped by a motorcycle policeman, who charged him with driving at the rate of 40 miles an hour for a part of a certain stretch of highway, 3½ miles long. It was shown at the trial that the defendant had slowed down his car in passing several intersecting roads and also had reduced headway in passing one other car on the road. The policeman admitted that Mr. Roosevelt did drive under 30 miles an hour except, he charged, for a long stretch of road on which there were practically no houses and no pedestrians or vehicles.

The contention was made by the defendant's attorney that the evidence showed Mr. Roosevelt to have been proceeding carefully when the safety of other users of the road was involved.

DECISION AFFECTING THE CAR OWNER'S LIABILITY.

The Appellate Division of the Supreme Court, Brooklyn, N. Y., handed down a decision upholding a verdict of \$1000 obtained by William E. Martin against an electric lighting company, the finding being based on the opinion that owners of automobiles are to a certain degree rendered liable for damage caused by their cars when driven by chauffeurs. The decision held that a jury might decide if a chauffeur's story was trustworthy and if not, in its opinion, it might give a verdict against the owner. The electric light company contended that its chauffeur was driving its car for his own pleasure.



Advocates Improved Road Construction

The futility of constructing extensive systems of public highways that will not stand up under the strain of heavy traffic has been pointed out by John K. Tenner, former governor of Pennsylvania, who made an enviable record as an advocate of good roads while in office.

"Hundreds of millions of dollars have been wasted in this country through the building of roads which will not stand the strain of heavy commercial traffic," he says. "What the United States must have is a comprehensive system of roads which will stand up when put to the test of carrying veritable trains of motor trucks bearing military stores, the outputs of factories and the products of farms needed for the consumption of the people living in the cities. This alone will reduce the high cost of living after the war and will make it possible for this country to supply stricken Europe with the machinery and produce it must have when this conflict is over.

"It may be too late now to give the country the needed roads in time to help the transit of military supplies for this war, but it is not too late to make the start in the right direction that post war needs may be met. Even if we did not prepare in advance in this respect to do our share in the war, we at least can profit by our experience and prepare in time to do our share in what is to come after the war has been won. This means the day of constructing anything but permanent highways has gone forever.

"Today the United States is producing more food stuffs than ever before in its history. Tomorrow the United States must materially increase its production of today. But production is useless unless the products can be moved to the seaboard and to the domestic consumers."

LETTERS FOR REGISTRY PLATES ARE PROPOSED.

A bill introduced in the Rhode Island Legislature provides for the substitution of letters in place of numerals on regis-

try plates for motor cars, trucks and motorcycles. The bill would amend the statutes relating to the operation of motor vehicles, making possible the adoption of a copyrighted system devised by Arthur C. J. Roy of Providence. This system provides an arrangement of letters on the plates so that four characters will indicate separate registrations running into six figures. It would be possible also with this system to use a plate of one size, which would never have to be varied, and one of smaller dimensions than those at present in use.

Increase In Car Accidents In Boston

The annual report of Police Commissioner Stephen O'Meara of Boston states that an increase of from 48 to 71 persons killed in a year by automobiles, is to be accounted for largely by the fact that accidents reported originally as resulting in injuries only have been followed up more closely this year than ever before, so that in 10 or 12 of this year's cases death was found to have ensued in from seven days to three months after the accident.

An average of two automobiles were stolen a day in Boston last year. An increase of 119 per cent. over the previous year. The total number is 730. Of these cars the police recovered 385. Police of outside towns and cities recovered 108. Automobiles stolen elsewhere but recovered here numbered 76. Arrests for automobile thefts numbered 195.

There were 1302 persons injured in automobile accidents in Boston in 1917. In 1916 there were 981. For the violations of the automobile laws the police prosecuted 5958 persons on 6240 charges. Of these 3977 were fined, 119 were found not guilty, 49 were sentenced to prison, 24 were placed on probation, 2026 were placed on file, eight were defaulted and eight were held for the superior court.

In 1916 there were 4664 charges, in 1915 there were 4172 charges, in 1914 there were 3829 charges and in 1913 there were 3190.

More Sound Advice From Judge House

Magistrate House of the Traffic Court in New York City has handled more traffic cases than any other justice in the world and the experience he has gained in this way lends considerable weight to his opinions. He frequently gives advice to motorists that is to the point and if followed would lead to the elimination of many accidents and deaths.

Following the arraignment of a number of motorists in his court on the charge of reckless driving, he made the following statement:

"What is the use of reckless driving? You bring trouble upon yourself. You may injure some other person. Is it worth while taking a chance?

"It is easy to do right. It requires effort to do wrong. Operators of motor vehicles know the traffic regulations. When you violate them you are conscious of the fact. You do this because you are willing to take the chance. A motor vehicle is not necessarily a machine of danger when operated by an intelligent person. Remember you are in personal control of the machine and that the law exacts intelligence, prudence and care on your part in its operation.

PAWTUCKET POLICE WATCH FOR VIOLATORS.

A campaign against violators of the traffic regulations has been launched by the police of Pawtucket, R. I. During the past few days many complaints have been received about drivers of wagons and automobiles who leave their vehicles standing on streets in the restricted zone for more than the time allowed in the present city ordinances.

The police have been lenient with persons leaving their machines standing on the main thoroughfares in the centre of that city, it is claimed. The majority of instances where the regulations have been violated have been when the persons have been from out of town and have not been familiar with the traffic laws of that city.



TOOL BOX AND FOOT REST. (Figure 389.)

In many instances the owner of an automobile finds that there is not sufficient room in his car for the necessary tools, tubes and other equipment required in case of road repairs. We illustrate here-with a unique, practical and easily constructed box, which can be made to fit flush to the back of the front seat in the tonneau with a sloping surface, upon which can be tacked linoleum or rubber stair tread. The length of the box is, of course, determined by the size of the car and the only fittings required are two flat hinges and two small brass hooks to secure the cover. The lock is a matter of preference. The box can be covered with imitation leather or painted to conform with the cover scheme of the car. This will hold pump, tire irons, jack, tubes, tools and various other devices necessary.

SILENCING NOISY BRAKE RODS. (Figure 386.)

This suggestion is practical in almost every instant for small cars where rattling brake rods are a source of constant irritation to those riding in the car. By a simple means of attaching steel springs, as shown in the illustration, this trouble can be easily overcome, thus helping to make the ride a pleasure by getting rid of this annoyance.

COMPRESSING SPRINGS. (Figure 387.)

One of the most exasperating things that the amateur automobile repairer has to deal with is the matter of compressing springs. For instance, the valve springs in an ordinary L head motor are usually hard to get at and require compressing before the valve pin can be put into place.

The following method will be found very practical for attaching wires to keep the spring compressed: Select two iron washers large enough to equal the outside diameter of the spring to be compressed and cut slots about $\frac{1}{4}$ inch wide, as shown at B. Place these washers on each end of the spring, having the slots pointing upward, and then place in a vise and screw up until the spring is fully compressed.

Now bend two wires in the form shown at A. These should be heavy enough to

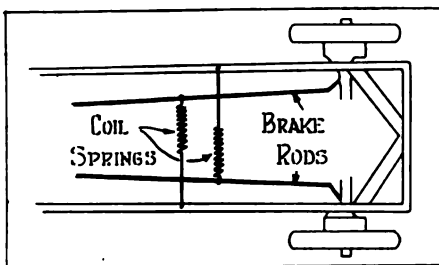


Fig. 386—Silencing Brake Rods.

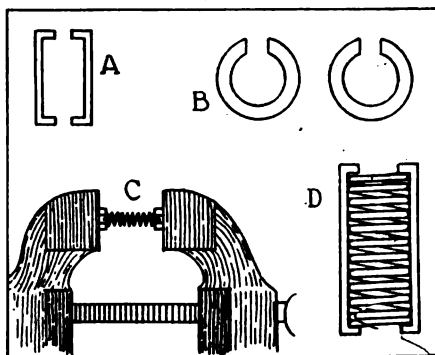


Fig. 387—Compressing Valve Springs.

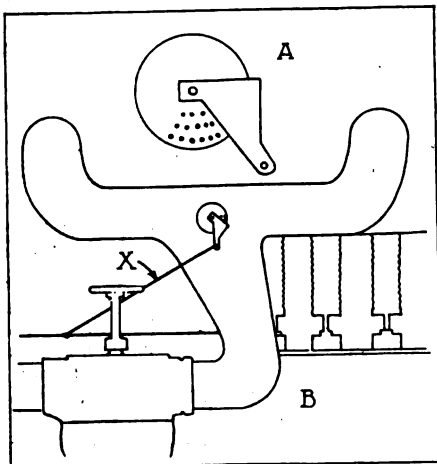


Fig. 388—Auxiliary Air Intake.

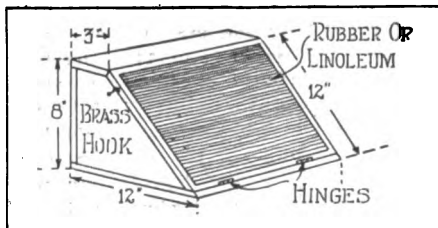


Fig. 389—Tool Box and Foot Rest.

hold the spring tightly, and the bent over ends should be just long enough to hook over the coil of the spring. The ends of the wires should be bent toward each other so that the tension of the spring does not slip them off. The sketch shows about the proper proportions and angles.

One of these hooks may now be inserted over the compressed spring through the washers. Turn the spring around, screw up on the vise and hook on the other wire. The spring will be held fully compressed by the two wires, as shown at D, which may be easily slipped off when the spring is in place, if the hooks have been properly bent.

Save the washers and hooks for the next time.

MAGNETIZED TOOLS.

Rub one of the poles of a strong horse-shoe magnet over the end of a long screw driver to magnetize it. You will be surprised at the things you can do with a magnetized tool. Pins may be put in place, screws entered in inaccessible positions or pieces of iron and steel picked out of a gear case or engine.

AUXILIARY AIR INTAKE. (Figure 388.)

In a great many cases much fuel may be saved if an extra air supply is provided for the engine when running on the higher speeds. You can make from a grease cup, a piece of sheet brass and a length of heavy wire an auxiliary air intake that will prove as efficient as many on the market. The cap of the grease cup should be perforated to make a number of holes in a triangular pattern, the piece of brass cut into shape and riveted to the centre of the cap and left free to swing on its centre so that by its movement the holes may be covered or uncovered. (See A.) The assembly is then screwed into the intake manifold, as shown at B, and a wire run from the piece of sheet metal to the throttle wire. As the throttle is opened and the engine speeded up the holes in the cup are opened by the throttle action and more air is admitted. When the throttle is closed, or nearly so, the air is prevented from entering. The correct setting and length of the wire, X, can be determined by experiment.

Tarvia

Preserves Roads
Prevents Dust-

Top—Lincoln Highway east of Greensburg, Pa., treated with "Tarvia-B."

In Circle—Boston Post-Road—a Connecticut section—treated with "Tarvia-B."

Bottom—Harrisburg Pike near Columbus, O., built with "Tarvia-X," 1915.



Good Roads to the Rescue of the Nation!

Our industrial and military mobilization has overwhelmed the railroads.

Embargoes, a desperate expedient to relieve the glut, are incessant embarrassments to shippers.

Even the Government cannot get its freight through. In some railroad yards the wrecking-derricks are used to get particular cars out of the jam by lifting them bodily from the side-tracks to the main-line. Switch-yards get so full that the main-lines are blocked by waiting trains.

But in those sections where long level routes of good roads connect the cities, motor-trucks are accomplishing marvels of long-distance transportation.

More and more New England is delivering to New York that way, and the Boston Post-Road hums

with the endless procession of heavy trucks.

Detroit is sending great caravans all the way to the seaboard, and that is a feat because all the roads are not good.

And one impassable mile in the journey is enough to clog the whole line.

Keep the roads good! Make them fit for the new traffic! That should be the watchword!

Construct and treat your roads with Tarvia. It will make them not only automobile-proof, but motor-truck-proof

Its use will exclude frost and rain and make an *all-the-year-round* road. It saves labor in replacements and repairs.

The use of Tarvia will insure *good roads at the lowest possible cost.*

PUBLIC ROADS

Whereas, It is essential that all the transportation facilities of the Nation should be brought to the highest state of efficiency in order that food-stuffs may be moved most economically from the farm to the market, that manufactured products be moved at the lowest cost from the factory to the consumer; and,

Whereas, The public highways offer a good, prompt, and economical means to supplement transportation by rail and water; therefore,

Be It Resolved, That the prompt improvement of our public highways is important and should be forwarded in every proper way.

—Resolution adopted at War Convention of the Chamber of Commerce of the United States, held at Atlantic City, Sept. 18th to 21st, 1917.



Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by any one interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will have prompt attention.

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Reciprocity Bill Fails In Jersey

Mosquito State Stands Pat on Fifteen-Day Touring Privilege—Auto Clubs Continue the Fight

Disappointed over the failure of the bill to establish a sliding scale of reciprocity, members of the Associated Automobile Clubs of New Jersey are preparing themselves for a fight which will be carried up to the next session of the Legislature. Whether the struggle will extend beyond that point depends upon the attitude of the law makers toward the pleas of the motorists for an extension of the 15 days which visiting automobilists are now allowed the freedom of New Jersey.

During the past session of the Legislature the motorists of New Jersey were granted the privilege of using yellow lenses on their automobile lamps and the speed limit for motor vehicles in the open country was extended from 25 to 30 miles. To get before the assembly their reciprocity measure, which sought to grant motorists from other states the equivalent, the associated clubs consented to their license reduction bill not being reported out of committee. The bill to license horse drawn vehicles, framed by President Turton of the associated clubs, was not introduced because of a wish expressed by the grange element that it be deferred. Disappointment at the failure of the latter to give the reciprocity measure better support was probably as much due to this as a belief that the lower part of the state really benefits more from touring motorists than the northern section.

State Motor Vehicle Commissioner Dill in opposing the reciprocity and license reduction bills made his fight from a financial viewpoint. The passage of these measures, he declared, would result in a loss of approximately \$700,000 annually for the state. Of this amount it is figured that \$250,000 is collected each year from non-resident motorists.

"Our contention," declared President Turton, "is that unlimited reciprocity would be the means of bringing in million of dollars of revenue to the State of New Jersey from foreign motorists, which although not paid into the motor vehicle department, would indirectly reach the people of the state. Before the passage of the reciprocity law now being operated in New Jersey, many motorists coming from the West in order to avoid New Jersey, practically circled the northern section of the state to reach New York.

"This inclination was partly eliminated by the 15-day reciprocity provision and it is safe to say that by extending to other states the same privileges which they extend to us the increase in trade and patronage by foreign motorists would many times offset any loss from license fees. Furthermore, we believe that the motorists, who are standing the greater proportion of the expenditure on

roads, should be given a fair amount of consideration as to their use, especially as the motorists of New Jersey could use the roads of all other states without restriction.

"Motorists do not confine their touring these days entirely to the State of New Jersey, and we believe they should have the right to enjoy the privilege of touring throughout the United States as freely as in one state.

"At the present time New Jersey allows only 15 days' touring privilege. This is the shortest period allowed by any state with the exception of Nevada, which doesn't allow any, and West Virginia, which allows 10. A number of the states allow 30 days and a great many allow as many days as they are allowed by the other states.

"The feeling for all-the-year-round reciprocal privileges is becoming so very strong that I am convinced that before many years automobiles will be licensed by federal authority and thus eliminate the imaginary state lines. We will then feel as though we were citizens of one great country."

STUTZ HAS NEW BODIES.

There are four new 16-valve Stutz models for 1918, changed here and there in the chassis and fitted by new bodies which show marked departures in certain detail from the former series. The four models are: The Bearcat on a 120-inch chassis, the roadster, the four-passenger and the six-passenger, which will hold seven comfortably. The latter three have a 130-inch wheelbase.

A smoother outline than before is noticeable in the bodies, the hood and radiator have a different shape and because of a wide cowl the front portion appears to be much longer. The characteristic double cowl in the four and six-passenger models has been removed and the back of the front seat extends slightly above the body sides.

The four-passenger might be called a strict close coupled design, following out the general lines of the six-passenger. There is more room in this model than last season's four-passenger, there is a large carrying space under the rear deck and the doors are larger.

The Bearcat body has received few changes aside from making its radiator and hood like the new ones. On all models this year there is the same form of spare wheel carrier used in the 1917 roadster, though holding the wheel vertically instead of horizontally. It is simply a dummy hub fitted with an easily removed locking device. There now is an instrument board instead of the usual dash, a new type of Hartford shock absorbers are fitted and the tire size

changed to 32 by 4½ C section tires instead of 34 by 4½ inches.

The Stutz company is manufacturing only four-cylinder cars with 16-valve T head engine, which, of course, means that the eight-valve offered optionally last season has been removed from the line. The design of the engine is unaltered, which also may be said of the cone clutch, power transmission system, the three-speed rear axle gearset and the axle proper.

The cylinders are 4¾x6 and are cast in block. Being a T head there are two camshafts, each operating eight valves on each side, the valve mechanism being enclosed by neat cover plates. Fuel is fed under pressure to a Stromberg carburetor attached to an external manifold. A hot air pipe reaches across the block between the second and third cylinders. Separate Remy units are used for starting and lighting, the latter being driven from the water pump shaft on the left. Ignition is by magneto.

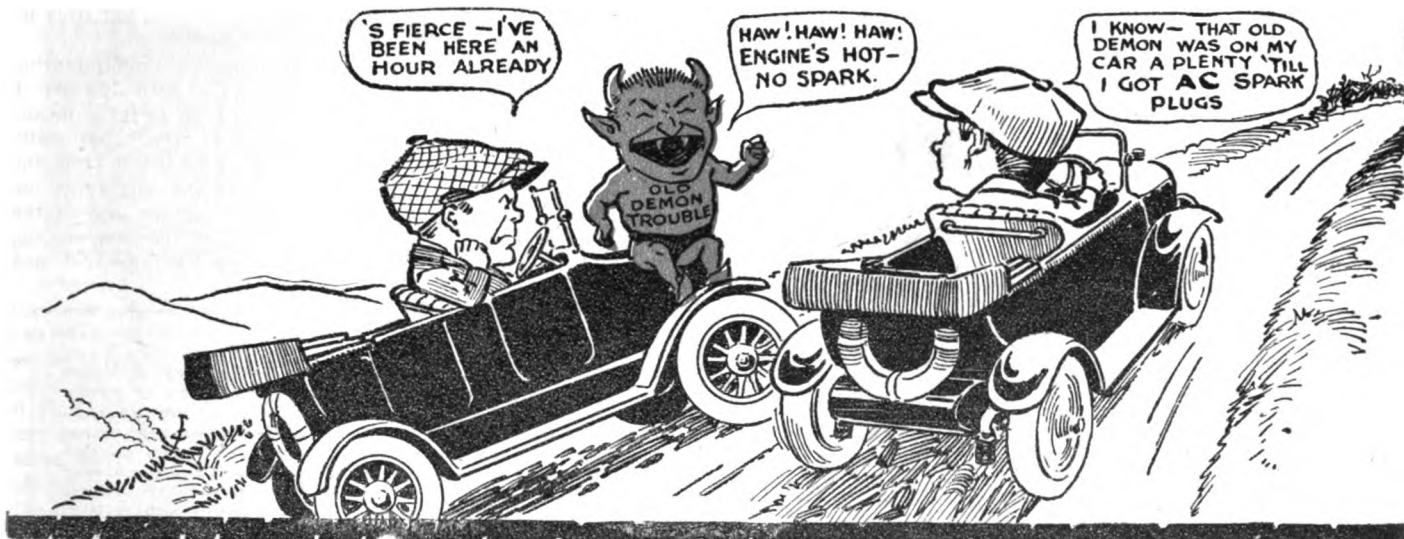
Many Changes In the King Motor Organization

H. C. Bradfield, Advertising Manager, Resigns and Will Be Succeeded by W. D. Nesbitt.

Following the announcement of the resignations of Vice President and General Manager T. E. A. Barthel and Chief Engineer T. P. Chase of the King Motor Car Co., comes a statement that H. C. Bradfield, one of the best known men in the industry, has voluntarily resigned from this company. Mr. Bradfield's duties will be taken over by Vice President W. D. Nesbitt, with headquarters in New York, and Robert Welsh, formerly with Maxwell and Briscoe, who joins the company as assistant to the sales manager. H. D. Snodgrass, who has held this position, resigns to enter the military service. Joseph D. Porter, who resigned as New York branch manager for the company, has gone into business at Wichita, Kan. J. C. Welch, who resigned as Detroit King branch manager, has joined a Kansas City firm. Still further changes are to be made at the King.

POSTOFFICE DEPARTMENT TAKES INTEREST IN HIGHWAY BUILDING.

Recently the Postoffice Department has taken a deep interest in the progress of highway improvement, the development of the motor truck and methods of utilizing both. There has been a reduction of farm production owing to the draft of man power into war service at a time when it is imperative that production should be increased. More convenient transportation would stimulate production. Although somewhat late in starting, the postoffice is endeavoring to overcome this loss through the "farm to table" movement.



These Manufacturers Use AC as Standard Equipment

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Pierce-Arrow	Oakland
Packard	Oldsmobile
Marmon	Nash
Hudson	Kissel Kar
Chalmers	Premier
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Chandler	Maytag
Haynes	Duesenberg Motors
Chevrolet	Dodge Brothers
Dort	Old Reliable
Cole	Trucks
Reo	Titan Truck
Paige	Ford Tractors
Peerless	Acme Trucks
Pilot	Netco Trucks
White	Gabriel Trucks
Delco-Light	Gramm-Bernstein
Murray	Trucks
J. I. Case	Moreland Trucks
Jordan	Wilcox Trux
Liberty	Sterling Trucks
MacFarlan	Republic Trucks
Paterson	Diamond T Trucks
Lexington-	F-W-D Trucks
Howard	G. M. C. Trucks
Scripps-Booth	Sandow Trucks
Crane-	Signal Trucks
Simplex	Brockway Trucks
Stearns-	Samson Tractor
Knight	Menominee Trucks
Saxon	Federal Trucks
Stutz	Riker Trucks
National	Stewart Trucks
Stephens	Wisconsin Motors
Jackson	La Crosse Tractor
Apperson	Advance-Rumely
Anderson	Tractor
Locomobile	Buffalo Motors
Daniels	Continental
Westcott	Motors
Singer	Deere Tractors
Dorris	Northway Motors
McLaughlin	Rutenber Motors
(Canada)	Sterling Motors
American-	Smith Motor Wheel
La France	Van Blerck Motors
Davis	Wallis Tractors
Sanford	Waukesha Motors

DO you know that poor insulation leaks electricity when it becomes hot? And the hotter it is the more it leaks. That is why many cars will sputter and die on hills when the same model—AC equipped—will scoot by on high.

Albert Champion means

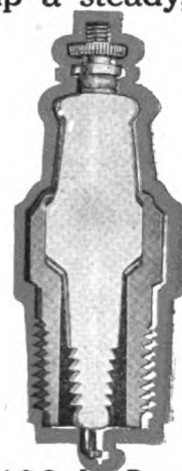
AC SPARK PLUGS

As a progressive *dealer* you should not run the risk of injuring your trade by keeping a stock of ordinary Spark Plugs! There's such an easy way to build up a steady, satisfied patronage by simply supplying AC exclusively.

Your judgment will have the backing of all these leading engineers. Read the list and see the *national* endorsement of AC Plugs.

The Standard Spark Plug of America

**Champion Ignition Company
Sole Manufacturers, Flint, Mich.**



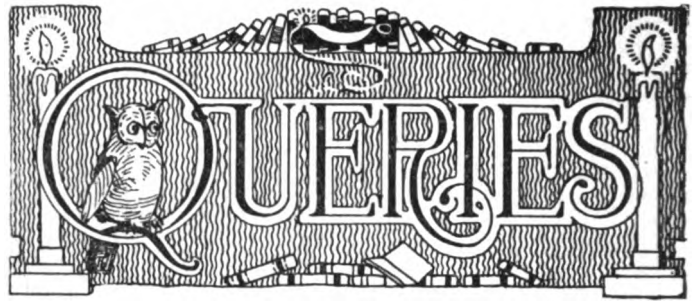
**AC Carbon Proof
For Fords
Overlands and
Studebakers**

The AUTOMOBILE JOURNAL

Is the oldest Automobile magazine published in America devoted wholly to the owners of passenger cars.

A quality magazine with prestige and circulation that brings results to advertisers.

TIMES BUILDING
PAWTUCKET, R. I.



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

WHAT METHODS OR MEANS HAVE YOU EMPLOYED IN EXTRICATING YOUR CAR FROM A DEEP MUD HOLE OR DITCH WHERE IT WAS IMPOSSIBLE TO OBTAIN TRACTION.

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 5th of April. The contest is open to everyone.

PUMP FAILS TO WORK.

(W. L. P., Atlanta, Ga.)

My car has been recently overhauled, but since leaving the repair shop it heats up quickly and frequently, which I believe is caused by the failure of the pump to work. As the repair shop is too far away to return the car under its own power, I prefer fixing it myself. Would you advise me to?

You do not mention the type or make of your car, so I can only give you general information, which, however, should be sufficient. There are two types of pumps, the centrifugal and the gear. The centrifugal pump consists of a case in which a small paddle wheel revolving forces the water through the system. In the gear form of pump this is done by two gears in mesh. Either type have the possibilities of a sheared driving pin or key, in which case the paddle or gear would remain stationary even if the method of drive at that point makes derangement impossible.

Perhaps poor circulation in the shape of swollen packing or rubber washers will block the passage through the piping. A sharp bend might cause a "kink," which would stop the passage of water through the rubber pipe. Then again sediment forming in a pocket such as an elbow or the bottom of a water jacket would prevent the free movement of the water. Failure of the fan drive might cause heating or the water might leak from the radiator and not be noticeable.

ENGINE STOPS SUDDENLY, THEN STARTS AGAIN.

(E. W. J., West Dennis, Mass.)

I have most peculiar trouble which I feel will be of interest to other readers beside myself, which I find very mysterious. Living in the country, where the roads are very uneven and rough, and while running along between 20 and 30 miles

ZENITH CARBURETOR

KNOWN the world over as the zenith of carburetor efficiency. A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

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NEW DEPARTURE BALL BEARINGS

Strength
Stamina
Service

The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensee

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an hour, my engine all at once stops and inside of 10 seconds to a minute starts again and shortly afterwards will do the same thing. I have examined all the connections, but every one seems to be tight, and have taken off the carburetor, but found nothing clogging the needle valve or gasoline intake pipe. Can you give me helpful advice in how to locate my trouble?

Your trouble is probably caused by a broken wire inside of the insulation, or by oil soaked wiring shorting at some part of the chassis. You mention poor roads, which, of course, will cause severe jolting, thus, perhaps, shaking a poorly insulated lighting wire against a metal bar that is in contact with two ignition wires. We would advise rewiring the parts liable to get in contact with metal and going thoroughly over the ignition system.

ENGINE IS NOISY.
(T. B., New York City.)

The engine of my car, which I bought second hand a short while ago, is very noisy and whether this is any one defect or a number I do not know. Would you answer through the Queries Columns of the Automobile Journal and suggest a remedy.

It is probable that the noise results from some one or a number of the following causes:

Engine bed loose in frame, flywheel rubs on pan, fan blades strike radiator, wear in valve operating mechanism, cylinders loose on motor bed, end play in crank shaft, sprung connecting rods or piston striking end of counterbore in cylinder, loose gears on engine and timing shafts, worn gears, bearings dry or loose in shell. The above is a general summing up of what could happen in a worn engine and a going over and adjusting of these parts will result in less noise.

DISSECTING AUTO CASING.
(E. E., Lynn, Mass.)

In the edition of the Automobile Journal of Jan. 25, page 14, relating to tire inspection and method of repair you state that the rubber covering should first be removed, etc., and this suggestion is referred to in other places. I have tried to remove the different layers on a scrap shoe, for experimental purposes, and fail to do so in a manner satisfactory to laying down again. Can you give me instructions in how to do this?

You evidently misinterpreted our meaning, as our article mentions an instance of the tread separating, not the entire tread being removed. When the interior portion of the tire is completed the casing is roughened and the breaker-strip cemented on. Over this is applied the tread (the part of which you ask information), which is a single section of rubber built of sheets vulcanized together. After this process the tire is wrapped in strips of heavy canvass by a machine that is designed to hold the breaker-strip and tread firmly against the canvass. The casing is then put into the vulcanizer and the live steam expands the compounds so that they become plastic and thoroughly unite. This is followed by cleaning, trimming and inside painting, after which the tire is complete.

From the above you will see that it is impossible to return the tread after it is once removed with satisfactory results.

ENGINE RUNS BETTER AT NIGHT.
(G. F. M., Lowell, Mass.)

Would you please explain to me why a motor seems to run better at night than in the day time. It has often puzzled me and I seem to get no logical explanation that satisfies me.

An engine certainly does seem to run better at night and, of course, there are possibilities for explaining this peculiarity, if it is real. During warm weather the air is naturally at a lower temperature at night than during the day and consequently a greater weight of air is drawn into the cylinder in one stroke, but with the same amount of gasoline as in the day time the result theoretically would be a more powerful mixture. That this advantage is enough to count is a point of difference among engineers. In warm weather there

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BOSCH MAGNETO

A SELF-CONTAINED electrical unit, providing efficient ignition without depending upon batteries or coils. It reduces all possible ignition difficulties to the minimum.

The ideal ignition system for motor cars.

Correspondence Invited

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MORE THAN 3,000,000 BOSCH MAGNETOS IN USE

Vaporizes Gasoline



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By completely vaporizing gasoline of whatever grade, the Wilmo Manifold permits carburetor to be turned down so as to give many more miles from every gallon, and practically eliminates carbon. Insures a smoother running engine at all speeds. Attached in a few minutes with an ordinary monkey-wrench. No holes to bore. Retail prices, \$7.50 (Ford size), and up. Sold on a money-back guaranty. Dealers and garage men: Write for interesting sales proposition.

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Well designed—built—finished

A well balanced car! Its stylish, modern body and ample roominess are linked with mechanical fidelity. A car you'll be proud of—a car with speed, quick action, flexibility. A car of low upkeep and economy—a car that will serve you long and serve you well.



Write for Catalog

Get all the particulars on this exceptional car value.

DEALERS

Our increased output enables us to offer this fast selling car to a few more live dealers.

Elkhart Carriage & Motor Car Company

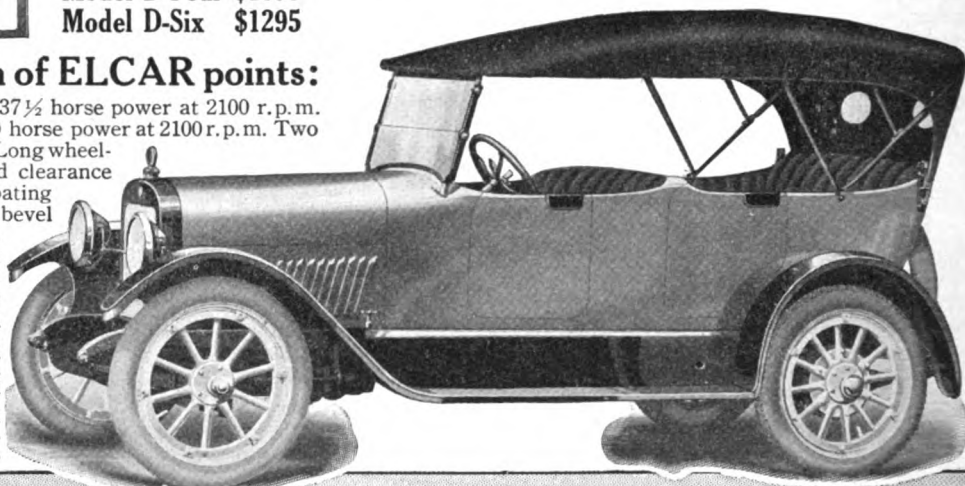
C-811 Beardsley Avenue, Elkhart, Indiana

Model D-Four \$1095

Model D-Six \$1295

Brief mention of ELCAR points:

Four-cylinder models, 37½ horse power at 2100 r.p.m. Six-cylinder models, 40 horse power at 2100 r.p.m. Two unit electrical system. Long wheel-base, 116 inches; road clearance 10½ inches. Full floating rear axle with spiral bevel driving gears. Timken Roller Bearings front and rear. Double universal drive; tubular propeller shaft—a wonderfully easy riding semi-elliptic spring suspension. Roomy and comfortable bodies of beautiful design and durable finish, new "Cathedral Pipe" upholstery. Equipment complete, even to motometer.



should be a gain from the use of night air, but during the winter a low temperature at night is a disadvantage, for the amount of gasoline that should be drawn into the cylinders would be questioned. In this case the expansion of air in the manifold due to the suction of the carburetor would make the temperature still lower and hot air piping should be used for the best results.

ON SPRING LUBRICATION.

(H. R., Paterson, N. J.)

I received my copy of the Automobile Journal of Jan. 25, which I found chock full of both useful and valuable information.

The subject or question of automobile spring lubrication was of intense interest and the two letters by J. C. Schwingle and R. L. Prindle, most certainly covered the question of how to lubricate springs. All automobilists know only too well what it is to crawl under a machine and the dirty, disagreeable hard job it entails to jack up the car to release the clips and spread the leaves apart, sandpaper the rust spots and uneven places. After doing all this then what? To find that after letting down the jacks there is very little lubricant left between the springs when pressed together by the weight of the car. Does anyone wonder why the springs are so often neglected?

I agree with the afore mentioned writers that they are the most important part in the whole automobile, for with good, reliable spring action at all times, 75% of the trouble caused by the car, including cost of upkeep, repairs, comfort and pleasure of automobiling would be saved. No, Mr. Editor, what we want is a self-lubricating spring that will stay lubricated, or one that can be lubricated by a woman, girl or boy as well as by a man, without muss or dirt and with no need to put on an old greasy suit and crawl under.

Editor's Note—The following list of spring lubricating companies might interest you: Babbitt Spring Oiler Co., Cleveland, O.; Brown Spring Oiler Co., Cleveland, O.; Dann Products Co., Cleveland, O. Write for literature.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

LOCATING FORD KNOCKS.

(J. M. F., Alden, N. Y.)

My Ford car has a knock which seems to be in the transmission, although I am not sure. Would you please give me some advice in how to locate same.

Locating engine knocks is motor detective work of the keenest kind and the system of "Look, listen and think" is the best. Of course the symptoms of different motor knocks are very confusing because they are so much alike, but each motor disease has a certain combination of symptoms that indicate a particular motor trouble.

Watching the motor when it is knocking sometimes reveals the loose parts causing the knocks. The sense of touch may be used if one end of a rod is held between the teeth and the other end held close to the suspected part of the motor. In this way the trouble can often be located.

The result of this investigation may be written down to keep the results in mind and by studying one can find the knock that has the proper combination to fit the symptoms.

Another useful hint is the relation between the crankshaft speed and the frequency of the knock. Does the knock occur twice, for every revolution of the crankshaft, once for every two revolutions, or is the knock irregular and caused perhaps by loose parts? If the main bearing is loose, there will be a thump for each time the fourth cylinder fires. A knock for each two revolutions may indicate trouble in the camshaft or valve tappets.

By using this means of analysis one can easily determine the cause from the effect working from the known facts observed.

GRINDING AND REBORING CYLINDERS.

(G. B. C., Industry, N. Y.)

Your set of Mechanical Automobile Books received in good condition and I am very pleased with them.

Would you please give me instructions in how to grind oversize pistons into cylinders. I think that I can do the

work much cheaper myself than have the garage men do it, as they ask a big price for this sort of work.

This work can be done by bolting the cylinder to a stand and using a boring bar or by clutching the cylinder in a lathe and using a grinding attachment. Grinding only enlarges the hole and does not tend to follow the former bore as would a reamer or boring tool. When the iron inside the cylinder is soft the reamer or boring tool will cut deeper than when the iron is hard, thus not cutting a true hole. A reamer will press the iron and require lapping to give satisfaction. The majority of machinists are returning to grinding rather than the other ways.

We should not feel justified in instructing you how to do this work yourself. A job of this kind must be done by high grade machinists, long experienced at this work. It also entails special equipment to secure close micrometric accuracy.

You do not state the make of your car or the number of cylinders. A four-cylinder job should cost about \$50, this including reboring the cylinders, grinding pistons, rings and possibly wristpins and fitting the big ends of new connecting rods. Many concerns specialize in this work and guarantee it as satisfactory. Of course such work as this will be costly, but it would be doubly so should you undertake it unless you have the special machinery, tools, jigs, etc., required to do the work satisfactorily.

SMOKE ESCAPING FROM EXHAUST.

(M. N., Orange, N. J.)

I have a 1913 four-cylinder Pope-Hartford car which has been giving me much trouble since I replaced the cylinders. I cannot stop the exhaust from smoking if I give little or too much oil. Can you give me any helpful advice? I blame this to cracks in the water jackets, resulting from welding.

If the smoke issuing from the exhaust is black and foul smelling the motor is being fed "too rich a mixture." If the smoke is blue or white there is an excess of oil, and if gray, there is too much fuel, as well as oil in the combustion charge.

Frequently leaky piston rings are the cause of excessive smoke and in order to find out if this is the case, remove the lower part of the crank case, after which the crank can be turned. In case of a leak there will be a bubbling hiss in the crank case, which will act as a sounding chamber. Test each chamber separately by opening the relief cocks in the cylinders not being tested. If the gas escaping past the piston for a length of time (upward to a minute or so), the use of a heavier "body" of oil for cylinder lubrication will cure the trouble. However, if the gas escape is of short duration it may involve a cracked piston, scored cylinder walls, broken, warped or gummed rings.

See repairing cracked water jackets, etc., in issue Feb. 25 of the Automobile Journal.

REMOVING MAXWELL CYLINDER HEADS.

(C. M., Williamsport, Pa.)

I thank you for the information given me about my Maxwell car, and would request some further information. I do not understand how to remove the cylinder head from the block and would be greatly obliged if you would explain how it is done.

The water must first be drawn from the cooling system. This can be accomplished by opening the petcock at the bottom of the radiator and allowing it to drain off. Loosen the hose connection between the radiator and the cylinder head and the bolt which attaches the fan to the cylinder head must also be taken out for the fan to be removed. After this has been done, unscrew the cylinder head bolts, when it will be found that the head is loose and can easily be removed.

Should the cylinder head stick, through the adhesion of the gasket do not attempt to pry it loose by inserting a screw driver or other wedge shaped instrument at the point where the head joins the cylinder casting, as this will destroy the gasket. If necessary to use force use a wooden mallet to loosen it.

In lifting the detachable head, care should be taken that the gasket is not damaged, for it will be impossible to make

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Do this 1/3 as often

NON-FLUID OIL lasts longer in compression cups because it is made of the finest materials and contains none of the non-lubricating ingredients used to "body" common cup grease.

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Get K-00 special grade for gears.
K-000 for bearings. At most dealers; in orange colored cans.

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Ever Change Tires?

When you do, you want it over as quickly as possible. The Inter-State Tire Carrier gives you the most convenient method of handling the spare tire.

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The Most Beautiful Car in America

It is a well-known fact that Paige Dealers are among the biggest money makers in the motor car field. An inspection of the Paige line will explain why.

Write for complete particulars

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Giant Searchlight

The highest quality lowest priced lamp produced

LIST PRICE	With Mirror	\$6.00
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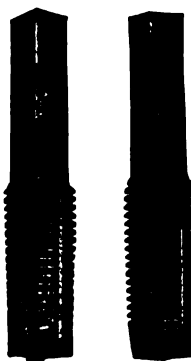
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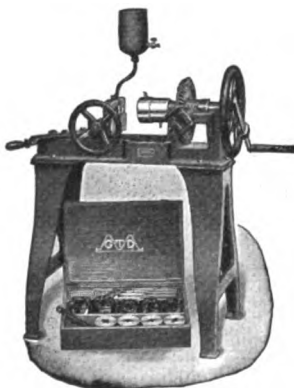
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G. T. D. Burring Reamer

Whatever your requirements in the screw cutting line may be, we can meet them, as our line is the most complete in the world. Bear in mind that our service in the threading tool line is unexcelled.

Ask for a copy of our No. 37 general catalog which contains besides the products listed below many tables of valuable information for garage repair men, etc.

Below is a partial list of products shown in the catalog.

Taps—All kinds, for hand and machine use, in all thread standards.

Dies—Several styles, for hand and machine use, in all thread standards.

Screw Plates—Many styles and assortments for bolts, nuts and pipe, with Automobile (S.A.E.), U.S.S. or V threads, combination assortments with both U.S.S. and S.A.E. thread taps and dies.

Pipe Tools, Wrenches, Vises, Cutters, Stocks and Dies.

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Send for a catalog for ready reference.



Greenfield Tap and Die Corporation

Greenfield, Mass.

New York, 28 Warren St.
Chicago, 13 South Clinton St.
Canadian Factory, Wells Brothers Company of
Canada, Ltd., Galt, Ont.

the joint gas or water tight when reassembling if the gasket is not in perfect condition. Be sure that the gasket is replaced in its exact position in order that there will be no gas or water leaks.

CAR KNOCKS GOING UP HILL.

(R. S. T., Oneida County, N. Y.)

I would like to ask some questions to see if my ideas would be feasible in this particular case.

Would cutting out some or all of the hot air feed to the carburetor from the manifold heater tend to keep the engine cooler and thus help the engine on hills?

Can it be that the fan forces air through the front of the radiator, thus tending to keep the head too hot. The engine gets much worse going with the wind than against it.

A careful examination of your questions indicate that the trouble lies in overheating. This may be caused by insufficient water circulation, the blocking of the water intake, outlet, or failure of lubricating system in the cylinders.

Perhaps improper timing or insufficient lift to exhaust valves may help to develop the knock and a clogged radiator will have the same effect as a partially clogged water jacket. Disconnecting the hot air feed from the manifold and a systematic cleaning of all the parts likely to obstruct air entrance may help in solving your problems.

If these remedies fail to adjust the engine troubles it may be necessary to install a water pump.

INSTALLING MOISTURE DEVICES.

(T. Karle, Dorchester, Mass.)

I have a 1912 Ford car and am considering installing a moisture device. Would you kindly explain how to install same and where to get the different parts.

There are many devices on the market and with the following description of the two classes you will be able to choose the best one suitable for your needs.

Water vapor or moisture devices may be divided into two classes. Those taking the water from the radiator and those designed with an auxiliary tank. Practically in every case the tendency is to provide a finely divided vapor or steam, for experience shows that a dry steam has more effect upon carbon than drops of water. In a device of the first type water is taken from the upper part of the radiator and passes into the special manifold, which replaces the intake manifold. Here the water is heated to a dry steam, whereupon the vapor passes into the intake manifold. Another device consists of a water tube running into and through the exhaust manifold connecting with the intake manifold. Water being taken from the radiating system and admitted through a diaphragm control valve, thus regulating the amount of water going into the engine.

Following are a few of the various companies manufacturing these devices: Vaporator Manufacturing Co., St. Louis, Mo.; Surnuff Combination Manifold, Surnuff Manufacturing Co., St. Louis, Mo.; the Hot Pin Manifold, the K B Co., 2015 Michigan avenue, Chicago; Vapor Inspirator Co., Inc., 755 Boylston street, Boston, Mass.

THE SPLASH LUBRICATING SYSTEM.

(W. L., Edgewood, R. I.)

Kindly explain the splash system of oiling and how it operates.

The supply of oil in the crank case is maintained by a mechanical oiler or vacuum controlled flow from an oil reservoir above the splash level of the crank case, or else a sufficient supply of lubricant is poured directly into the crank case and replenished as often as necessary.

The oil is splashed to the various bearing surfaces within the engine by the connecting rods, which dip into it as they revolve. On some engines adjustable oil feeds are used to control the supply at a certain level in the engine base, which is indicated by sight feeds in many systems.

As the oil once going to the engine base is not returned to the reservoir. This system is often referred to as the "all-loss" system.

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CHARGING A STORAGE BATTERY.

(R. M., Chelsea, Mass.)

I have installed on my Maxwell car, model No. 25, a two-three cell storage battery and would like to have directions for recharging it. I have access to a 110-volt house current and would like to know the polarity and how many lights to use for resistance.

Since you do not state the make of your battery we are not sure that our data is correct. The following directions apply only to the Presto-Lite storage battery, type 127 W. M. 40 ampere-hour, 12 volt battery.

Connect the battery with switches and two 32 candle-power, 110 volt (carbon) filament lights. Be sure that the 110 volt current supply is direct current. The meter should show this and if you are not sure the current is 110 volt current is direct current, phone the lighting company and they will advise you. Should you connect with alternating current your battery will be ruined.

Commence the charge at the current rate of six amperes and continue to charge at the maximum rate until the cells begin to gas or bubble freely. When one or both of these conditions are obtained, reduce the charging rate to two amperes and continue to charge until the cells again gas freely and the specific gravity of the electrolyte ceases to rise. This should be at a maximum between the value 1.275 and 1.285. Make sure that the battery is full, but do not overcharge. The temperature of the electrolyte should not exceed 100 degrees Fahrenheit during the charge. If this temperature is exceeded cool the battery by reducing the charging current or by temporarily stopping the charge.

The period of charging should not exceed 15 hours.

TIMING CHANDLER 1916 MODEL.

(D. B., Bronx, N. Y.)

Would you kindly inform me through your columns how to set the timing gears on a Chandler 1916 model? I cannot see any mark on the crankshaft gear or on the camshaft gear. I did not make any marks when I disassembled the engine.

The firing order of your motor cylinders are 1-5-3-6-2-4. The inlet valves are numbered 2-4-6-8-10-12, and the exhaust valves 1-3-5-7-9-11.

The exhaust valve is timed to close $1\frac{1}{2}$ inches past dead centre on the suction stroke and the inlet valve opens at $1\frac{1}{2}$ inches past dead centre on the same stroke.

To check the setting of the camshafts the punch marks on both sprockets will line up with the sprocket centres. The marks you cannot locate will be found on the edges of the sprockets nearest one another.

OVERHAULING THE FRANKLIN.

(Continued from Page 22.)

To the pinion gear shaft fit a wood handle so that the pinion can be turned by hand. Turn the gear as rapidly as possible and listen to the assembly. If the gears are in good condition and the adjustment is correct there will be little or no perceptible friction and practically no noise. Adjust the pinion and differential until these conditions result. Should the master gear be backed away from the pinion or carried toward it, the pinion should be backed out or turned in an equal distance, the total distance being obtained through both adjustments rather than by either one singly.

After the differential has been assembled the axles should both be put into place and the axle adjusting nuts, together with the bearings, put into place. Any end play of the axles should be compensated for by the bearing adjustments, care being taken to leave a slight amount of play as directed for roller bearings of this type.

The writer not long since visited a garage where a mechanic was replacing a wheel upon a car and was surprised to see that the mechanic pounded the wheel upon the taper shaft with a hammer. The reader is cautioned against this practise, for in any car it is sure to result in differential troubles, sooner or later. The wheel should be slipped into place and tightness obtained by setting up on the axle nut, put there for that purpose.

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Play an Important Part in the Success of America's Leading Automobiles, Motor Trucks and Tractors.

Every automobile engineer will tell you that the Life, Power, Speed, Hill Climbing Ability and Operating Cost of a gasoline driven vehicle depends on its motor.

The strength and power of any motor depends largely on its compression. Perfect Compression means an efficient, clean, smooth running motor.

A motor without perfect compression is troubled with improper lubrication, lack of power, and an accumulation of carbon.

STA-TITE RINGS give Perfect Compression and overcome these troubles—besides saving on oil, gasoline and repair bills.

STA-TITE RINGS insure proper lubrication and prevent pistons from wearing dry and scoring cylinder.

STA-TITE RINGS are guaranteed to be leak proof.

Dealers You should sell STA-TITE RINGS. The three piece construction assures equal distribution of pressure on cylinder walls.

Remember—STA-TITE RINGS are manufactured by the largest manufacturers of piston rings in the world.

Send NOW—TO-DAY for "TWELVE REASONS" why STA-TITE RINGS will prove to be business builders.



110 Sanford St.

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Makers Also of "Quality" Snap Rings

Universal Motor Truck Accounting System \$10.00

Will buy a complete, practical system that any one can operate and which contains all forms needed for one year.

THE SYSTEM INCLUDES:

350 Day Cards
1 Day Card Carrier
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From these data, operating costs and earnings can be obtained in a few moments. Any clerk can keep the records of one or 100 trucks.

MOTOR TRUCK

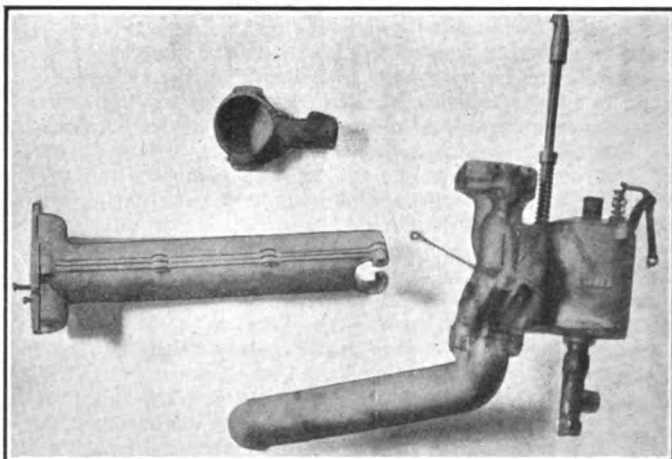
Times Building

Pawtucket, R. I.

The steering gear is of the conventional worm and wheel type and should examination show the need of repairs to this unit it should be taken to a repair shop.

Timing and Adjustments.

Before the timing gear on the camshaft is locked in place the valves should be properly timed. Set the piston in number one cylinder at the extreme top of its stroke, then turn the flywheel toward the right one inch, at this point the intake valve in number one cylinder should start to open. Turn

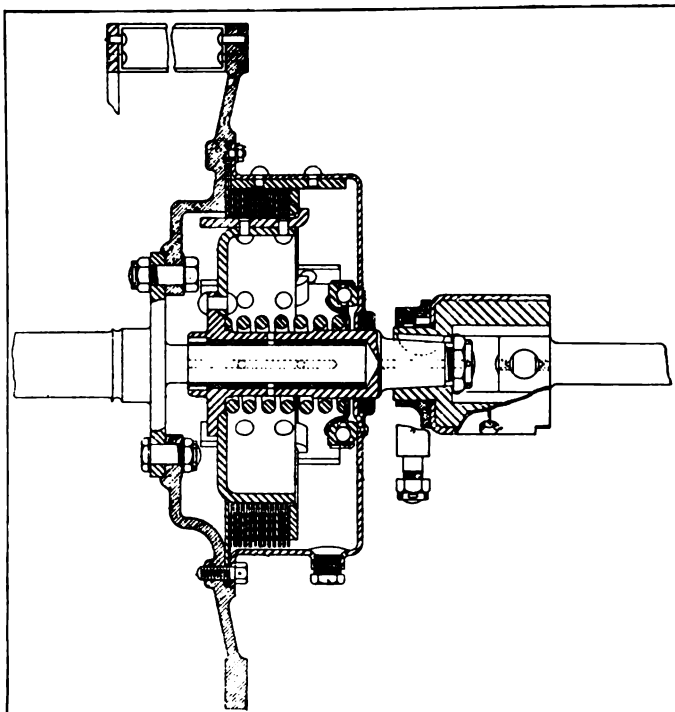


The Specially Designed Franklin Carburetor Intake Pipe and Fitting.

the camshaft in a counter-clockwise direction until the push rod, actuating the inlet valve, begins to lift and mesh the gears.

After the camshaft has been set and the timing gear locked into place, the magneto should be adjusted. Turn the flywheel back again to dead top centre and remove the breaker box and magneto distributor covers. Turn the magneto shaft until the distributor is beneath the terminal leading to number one cylinder, and in its direction of rotation until the breaker points just begin to snap apart. At this point the magneto gear should be meshed with the timing gears.

The carburetor is fitted with but a single adjustment, controlled from the dash. Under ordinary conditions the engine will run with half a turn opening and at this point the dash indicator is at zero.



Sectional View of the Flywheel, Which Incorporates Fan and the Clutch.



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Your dealer will show you just the size you need for your tool kit, or for repair work.

He will recommend the COES wrenches as all good dealers have done for fifty years.

Coes Wrenches do not break, or wear out, in service life they cost less than any other tool made.

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LUBRICANTS

FRICITION HAS NO CHANCE

on bearings and gears when you use DIXON'S. They reduce friction to a minimum. Write for Booklet No. 210-G and Lubricating Chart.

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THE STANDARD OIL
FOR ALL MOTORS

Standard Oil Company of New York

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IF We Win

this will be the last war

If We Lose

—It will be but the beginning of wars upon wars, a holocaust with slaughter, famine and unspeakable horrors.

The issue is plain. It is up to you. Either sacrifice now or make the supreme sacrifice later.

SAVE NOW, BY PLAN, TO BUY

THIRD LIBERTY BONDS

LIBERTY LOAN COMMITTEE OF NEW ENGLAND
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Nearly a Million FORDS on the Road

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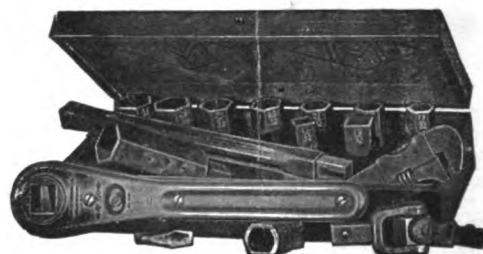
And Special Tools for FORDS



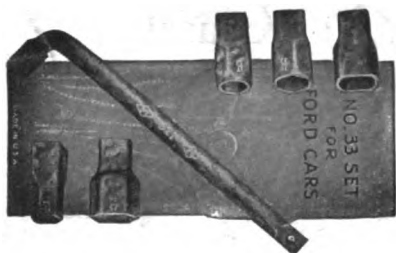
No. 17 Set—Heavy duty for Ford. 10 sockets, including those special sockets for spark plug, rear axle housing and cylinder head nuts. Price each, \$2.00.



No. 30 "Ideal" Set for Fords. 10 sockets, including all special sizes. Ratchet handle, universal joint and extension bar. Price each, \$4.00.



No. 15 "Major" Set—Covers all adjustments on Fords, including reversible ratchet handle. Price each, \$5.00.



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Insurance

If your dealer cannot supply you we will ship prepaid on receipt of price.



Specially designed for Fords. Engineers' wrenches. 5 wrenches. 10 openings.

Your copy of complete Mossberg Tool Book No. 191A if you will send address.



No. 646, Reverse and Brake Pedal Tension Spring Wrench. The only practical wrench for this work. Each, 50c.



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AUTOMOBILE JOURNAL

DEVOTED TO
OWNERS OF NEW AND USED CARS, DEALERS AND REPAIRERS

VOL. LXV.

PAWTUCKET, R. I., MARCH 25, 1918.

NO. 4.

No. 30 GARAGE SERVICE Sets



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Car owners reap the benefits and are assured of a good job, quickly done and at minimum cost. Every tool is specially designed and made to serve a specific purpose. These 30 wrenches, some with two sockets, are equivalent to 39 different sizes and types and are perfectly adapted for work on any car. The combination includes:

Offset Wrenches 13	Special Wrenches..... 5
Speed Wrenches 10	Demountable Rim Wrenches 3
L-Wrenches..... 6	Tee-Handle Wrenches..... 2
Total.....	39

List Price, \$20.

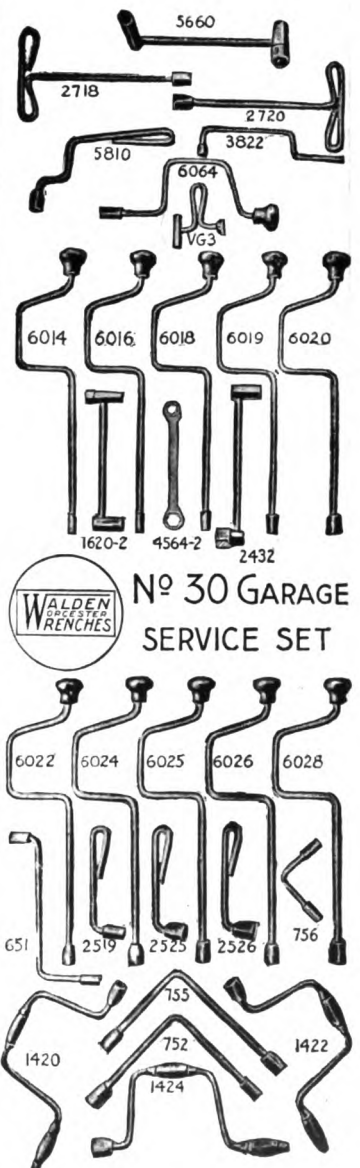
With the No. 30 Garage Service Set the repairer has all wrenches needed, standardized equipment, and tools that insure the quality of work done.

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WORCESTER, MASS.



IF We Win

this will be the last war

If We Lose

—It will be but the beginning of wars upon wars, a holocaust with slaughter, famine and unspeakable horrors.

The issue is plain. It is up to you. Either sacrifice now or make the supreme sacrifice later.

SAVE NOW, BY PLAN, TO BUY

THIRD LIBERTY BONDS

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LIBERTY BUILDING, BOSTON

PAIGE

The Most Beautiful Car in America

We Will Stick

Never before in the history of the Paige-Detroit Motor Car Company has there been such a demand for Paige cars. Never has the demand for Paige cars been so general. Every state, county and city of the United States is demanding a greatly increased quota. Every Paige dealer these days is active and insistent.

In our judgment these extraordinary Paige sales—in this War-Year of 1918—prove several things. They prove that the American people recognize the fact that the motor car is an indispensable utility; that they are buying motor cars carefully and intelligently; that they are buying only the best cars; that they are selecting the Paige because it is a sound, conservative, profitable war-time investment.

For this overwhelming endorsement of Paige cars, the Paige-Detroit Motor Car Company and Paige Dealers are grateful indeed. We regret that we cannot increase Paige production to satisfy every Paige purchaser and enthusiast.

Undoubtedly, you know why Paige production cannot be increased—in this War-Year of 1918. We cannot discuss the tremendous expansion the Paige has made these last nine months to meet the needs of the government, the nation and the CAUSE—the greatest cause since the birth of civilization—for which it is the great PRIVILEGE of all of us to fight.

Always we will strain every nerve and energy and tax every resource to meet the needs and wishes of that vast body of sentiment that has brought us success—our Paige Patrons.

But we feel that we—and YOU—have an infinitely greater obligation to discharge, an infinitely greater task to perform. To accomplish this the Paige-Detroit Motor Car Company has pledged itself to invest every dollar of its huge capital and all the brains and brawn and patriotism of the thousands of men who rally beneath the Paige Banner. We Paige men are in this Fight to Win.

“And we won’t come back ’til it’s over, ‘over there’.”

PAIGE-DETROIT MOTOR CAR COMPANY, DETROIT, MICH.



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are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

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A grade for every type of motor.
It is sold in sealed containers.

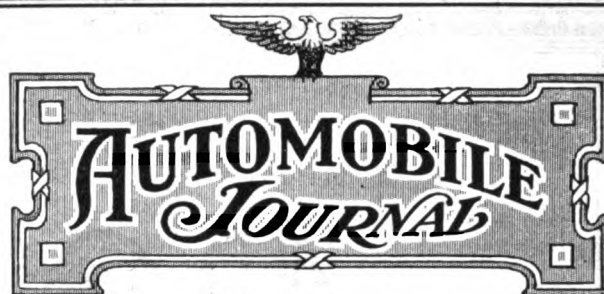
*Let us send you our new book and chart.
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NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street



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TRADE OUTLET

DON'T MISS THIS

If you want to get some nice, fresh, pliable second tires at very low prices send us an order. Before opening this store we went direct to the factories and bought a large stock. Our large purchase and ready cash enabled us to get these tires at a much lower figure than the ordinary tire dealers get them. No old or shopworn tires in this stock. Every tire is good for a lot of mileage.

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30x3½ Firestone.....	\$8.25
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We also have a large stock of the following makes: UNITED STATES, GOODRICH, BATAVIA, HOOD, ETC.

30x3	\$7.00	33x4	\$16.05	35x4½	\$23.10
30x3½	9.50	34x4	16.50	36x4½	23.30
32x3½	11.50	35x4	18.75	35x5	26.45
31x4	14.90	36x4	17.60	36x5	30.00
32x4	15.30	34x4½	21.80	37x5	28.50

Non-Skid 10% Extra

Mail Orders Given Prompt Attention.

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30x3	2.85 & up	38x4½	8.00 & up
30x3½	3.95 & up	34x4½	8.00 & up
32x3½	5.00 & up	35x4½	8.00 & up
34x3½	6.00 & up	36x4½	8.00 & up
31x4	5.00 & up	37x4½	8.50 & up
32x4	5.50 & up	35x5	9.00 & up
33x4	6.50 & up	36x5	9.00 & up
34x4	6.00 & up	37x5	9.00 & up
35x4	7.00 & up	38x5½	12.50 & up

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Automobile repair work in all its branches. Doing the most satisfactory work. Skilled workmen, good materials, moderate charges. Radiators, Fenders, Hoods, Tanks, Boxes, Pans, Sheet Metal work.

Insure your Radiator from freezing by using

PEERLESS ANTIFREEZE.

It prevents loss of use of car and loss of time resulting from laying up of car.

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Special Price **\$2.65** Made to sell for \$8. Is complete with hose and pressure gauge.

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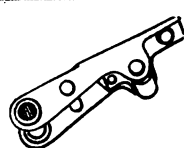
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Size	Plain	Non-Skid
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32x3½.....	12.05	14.00
33x4	16.85	19.00
34x4	17.25	19.75
35x4½.....	24.25	27.00
37x5	28.00	35.00

All other sizes on request.
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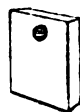
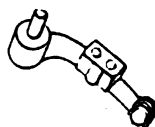
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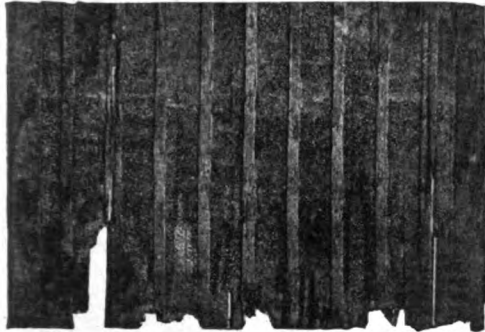
It makes no difference what kind of a battery you are now using we can take care of your

Repairs—Testing—Re-Charging

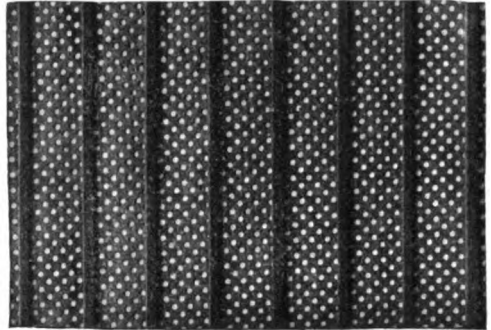
And when it comes to new batteries, see the Davis-Lynn to be convinced they are constructed along the right lines to insure long life without repairs or rebuilding.

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Actual Photograph of Rubber Separator after being in Electrolytic Acid Seven Years.

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OF

USED TIRES IN New England

Our Used Tires are better than any other and we can fill any order of any size tire from 1 to 1000 of any size. Would you pay \$12.20 for a 30x3 Tire when we can sell it to you for \$3? Or would you pay \$50 to \$60 for a 37x5 Tire when our price is \$10.

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30x3	.. 3.00 up	35x4 1/2	.. 8.00 up
30x3 1/2	.. 3.75 up	36x4	.. 7.75 up
31x4	.. 5.00 up	36x4 1/2	.. 8.00 up
32x2 1/2	.. 5.00 up	37x4 1/2	.. 8.00 up
32x4	.. 6.50 up	35x5	.. 8.50 up
33x4	.. 6.50 up	36x5	.. 9.00 up
34x4	.. 6.50 up	37x5	.. 9.00 up

We carry at all times firsts and seconds of all well known makes, including, U. S., Fisk, Goodrich, Goodyear, Empire, etc. Special price on 37x5 tires. New Seconds.....\$23.00

Free delivery to all parts of New England if order is followed by check or money order.

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169 Massachusetts Avenue

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LECTRO FLATERS

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ELECTRIC DRILLS

Boe Automatic Oil and Grease Guns

Write to us direct giving name
of your jobber.

Ask for our Price List and
Circular No. 87-A.



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Our references should command your attention. Any Boston tire agency, Dunn's and Exchange Trust Co.

Mgrs. K. S. Brayton, George Vallyely.

30x3	...\$3.30	34x4	... \$8.00
30x3 1/2	...\$4.50	34x4 1/2	... \$9.00
32x3 1/2	...\$4.85	35x4 1/2	... \$9.00
31x4	...\$6.00	36x4 1/2	... \$9.00
32x4	...\$6.00	35x5	...\$12.00
33x4	...\$7.00	37x5	...\$10.00

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50% to 75% Off Mfg. Price List.

Parts for Packards, Buicks, Chalmers, Overlands, Jacksons, Fords and 75 others. You can save 50% to 75% from accessories.

Mail orders will be attended promptly. Tel. Brockton, 910.

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GLOBE VULCANIZING CEMENT.

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Fernwood, Delaware Co., Pa.

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We furnish parts at a saving of

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Off Manufacturers' Price List.

If you're in a hurry just take your parts book of your car and deduct one-half of the price in there and write, wire or phone us the order. We will ship parts the same day your order is received. Special discounts to dealers.

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Write Our Sales Department About
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GREAT SLAUGHTER on Second Hand Auto and Truck Parts of all descriptions, including Magnets, Carburetors, Starters, Head Lights, Radiators and everything pertaining to the automobile. Consult us first and save yourself time and trouble.

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AUTOMOBILE JOURNAL

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a Copy

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MARCH 25, 1918.

NO. 4.

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Treasurer . . WILLIAM H. BLACK

Secretary D. O. BLACK, JR.

Published the 10th and
25th of each month by the

AUTOMOBILE JOURNAL PUB. CO.

Times Building, Pawtucket, R. I.

PROBABLY the most important announcement of the year affecting the motoring public was that of a voluntary curtailment in passenger car production, made by the National Automobile Chamber of Commerce on behalf of its 117 members. This reduction in the output will total about 30 per cent. of the unfinished schedules of these manufacturers, which means that instead of approximately 1,719,000 cars this season the industry will turn out but 1,250,000. The car manufacturers will suffer practically no loss or disorganization through this curtailment, as in most every instance the plants have larger war contracts, which will keep them busy for many months to come. The effect will be greatest upon car prices as there is every indication at present that the supply will not be sufficient to meet the demand. In England, following the curtailment of car production, prices of used cars rose to seemingly prohibitive figures. Most of the popular makes of cars, after three or four years use, could not be purchased for less than their original selling price and in some instances cars from one to two years old sold for from 30 to 40 per cent. more than they originally brought. It is not expected that only a partial curtailment here will have such an extraordinary effect as it did in Europe, but it will be marked and both new and used cars will advance in price. In cutting down the quantity of production, additional expense automatically accrues to overhead costs, a fact which will of itself tend to make prices higher, while the cost of distribution will also rise by reason of the same token. Thousands of passenger cars will also be converted this year to commercial uses with the now popular and practical truck making units, which fact will be responsible for a further cut in the available supply of cars.

IN OPPOSING the measure now before the Massachusetts Legislature, which provides for a surtax on motor vehicles and operators, J. B. Sullivan, the representative of the Boston Automobile Dealers' Association and the Boston Commercial Motor Vehicle Association, contended that the owners of automobiles already pay their full share of taxation. He asserted that on their cars as personal property they pay fully \$3,000,000; for registrations and licenses, \$2,500,000, and at least \$1,250,000 for the government tax. This total of about \$7,000,000 is more than half as large as the total received by the state from the income tax.

AS A trade barometer alone the Boston Automobile Show this year rendered a valuable service to the country's motor car industry, as well as the extensive automobile trade throughout New England, as it revealed so clearly the prospects of a busy, prosperous season and eliminated the last vestiges of doubt from the situation. When there is any timidity or uncertainty as to the public's attitude the only way to determine if there is really a wave of pessimism or optimism abroad is by affording the people an opportunity of public demonstration. Such an opportunity was presented in the Boston Automobile Show and at the close of the opening night practically every one was satisfied that an enthusiastic attitude of optimism and progressiveness was the dominating spirit of the times.

This was true among the thousands of dealers, agents and supply men that visited the city during show week. In the smaller towns and suburban districts an unprecedented state of prosperity exists according to reports from these business men, who bought liberally to replenish their stocks of merchandise for the spring season.



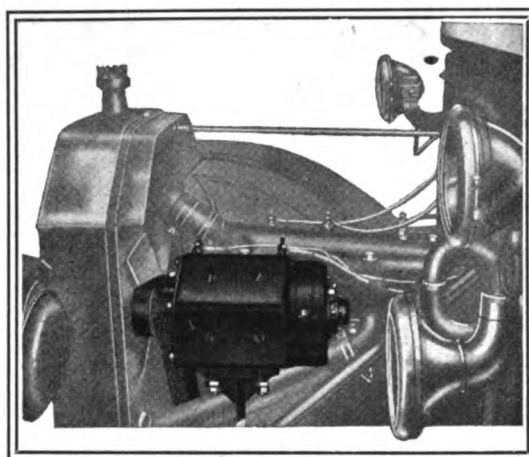
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Single-Unit Electric

Starting and Lighting System

Type A for 1917-18 Cars
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Dependable
Winter and
Summer



Simple
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Efficient

Outfit Complete, Ready to Install

\$85.00

F. O. B. Syracuse, N. Y.

Quality

The same high standard of workmanship and material which has characterized the outfits we furnish for the Franklin, Holmes, Elcar, Crow-Elkhart, Dixie and numerous others.

Power

It actually assists rather than robs the engine of power.

Non-Stalling Feature

Your engine cannot stall in congested traffic or at hazardous points, such as car crossings. The Dyneto automatically turns from a motor to a generator and back to a motor as car speed changes.

Guarantee

To anyone doubtful regarding the efficiency of our equipment we will agree to furnish one outfit subject to return for credit within 10 days if not found satisfactory, providing it is in the same condition as when shipped and transportation charges are prepaid.

ANNOUNCEMENT

In addition to the famous Dyneto Type "B" Single Unit outfit, the new Type "A" equipment especially designed for the 1917-18 Ford cars will be ready for distribution May 1st. This outfit includes several new features, such as cowl panel, tail lamp, large gear reduction, permitting charging of the battery at low speed, improved attaching bracket, etc. Either Type "A" or Type "B" outfit shipped complete with battery, switches, wires, etc., upon receipt of \$85.00. When ordering send draft or money order. Send today.

Dealers: Wire for our agents' proposition

DYNETO ELECTRIC CORPORATION

SYRACUSE, N. Y.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

The AUTOMOBILE JOURNAL

VOL. LXV.

PAWTUCKET, R. I., MARCH 25, 1918.

NO. 4.

Banner Year In Highway Construction Over \$260,000,000 To Be Expended A War Necessity

Federal Government and States Will Carry out Programme of Road Building During 1918 That Will Exceed All Previous Work in That Direction by Over Eighty Per Cent. in Amount of Expenditures

PRIOR to the advent of the automobile, state or Federal cooperation in the construction of improved highways was a thing almost unknown, but as the automobile developed the various states gradually took up the good roads movement. The shouldering of this work by the states met with considerable opposition by certain elements, particularly those in the rural sections, as it was looked upon as an attack on the public funds for the benefit of a certain class at the expense of another. This feeling persisted to such an extent that the good roads movement always lagged behind the development of means for transportation of goods and passengers over the roads by motor vehicles. There were over 3,000,000 motor cars in use and the various states had spent hundreds of millions of dollars on improving the highways before Congress could be convinced that Federal aid in building and maintaining highways throughout the nation was not only a great economic factor for the country's benefit. Then only a comparatively small sum was appropriated and that to be apportioned to the different states over a period of years for expenditure on certain highways.

The war came on and at first officials still imbued with this lack of foresight, issued orders that would have greatly restricted the construction of highways. Not many months elapsed, however, when it became evident that the motor truck would have to take the load from the railroads, which had been revealed as a medium of transportation terribly inadequate to meet the gigantic haulage needs of the country. There was then a quick change of front on the part of

those advising the administration, as it became apparent that the motor truck was the only thing that could save the situation. Several months of extraordinary use of these vehicles by the government soon brought out the fact of the terrible mistake that had been made in not developing the country's highways so that the automobile and truck could give their maximum service to the country.

That this great error in developing the country's resources has been recognized and will be remedied is indicated by the preparations now being made by Federal and state governments for extending and improving the highway systems so that in practically every section of the country the means of distribution will have been increased to a point where much of the present freight congestion will be relieved and the whole nation benefited by quicker and more efficient delivery of farm produce, as well as manufactured products.

The stupendousness of this movement for better highways was revealed in a compilation of statistics issued by the touring bureau of the B. F. Goodrich Rubber Co. which secured the figures through cooperation with the highway departments and highway commissioners of all the states in the Union. The report made after the investigation was completed indicated that no less than \$263,096,610 would be spent for highway improvements during the current year by the combined forces of the government states and counties.

This sum is larger by 82 per cent. than the expenditures of any previous year and in money more than that of 1917 by \$118,797,750. What this means to the

nation in winning the war to every motor car owner, truck operator and to the motor car industry could not be estimated, but it certainly foreshadows a greater development of the automobile during and after the war than could ever have been hoped for under old conditions.

During the past 20 years the motor car has gone steadily ahead, being improved mechanically and in efficiency and increasing in numbers at a rapid rate while the movement for better roads, which meant ideal and economic operating conditions for the automobile, lagged from public support. The temporary curtailment in car production will have but the effect of a temporary lull in the output, so that the industry can shape itself for even greater effort if the country is going to have a comprehensive system of improved permanent highways, stretching from the farming sections into the cities; from the manufacturing centres to the distributing points and through sections that heretofore have been but partially developed for lack of transportation facilities.

Commenting upon the outlook, the Goodrich report says that the officials of the government and states say that the appropriations for this year represent but "a drop in the bucket" as compared with what should be spent before the war has concluded. They admit that enormous appropriations have been made to improve the railroad situation, but that the total for the year is little better than half what Secretary McAdoo has announced as being necessary for the upbuilding of the over-taxed American railway system.

Probably the most significant fact

Value of Highways Estimated at \$6,240,000,000

brought out through the situation and one that will prove a great surprise to the average person, is that calculations by government officials indicate that with good highways, motor trucks and motor vehicles are capable of carrying approximately 200 per cent. more freight than the railroads. In these same calculations they estimate the value of our highways at \$6,240,000,000.

Analysis of the accompanying tables shows that the sections where the productive possibilities are the greatest through improved highways, have made the greatest appropriations, this being particularly true in the South and Middle West. Texas, the largest state in the Union, is keeping apace with its geographical proportions, having a road programme which calls for the expenditure of \$25,000,000 this year as against only \$5,000,000 last year.

Per Capita Expense \$2.35

The remarkable feature of this year's national program is the overshadowing of the automobile industry by the highway building industry. Last year was the banner year in automobile production and yet this year's figures on road improvement transcend the increased automobile production of last year by 35 per cent.

The expenditures for highway improvements will be approximately \$2.35 per capita; or, to italicize this, each man, woman and child in the nation would contribute this much for the building and bettering of roads for the movement of supplies were taxation on such a basis. Were the expense apportioned out on an average basis each state would pay \$5,400,000.

Necessity for vast improvement of road conditions is emphasized in reports from the south, where unprecedented truck travel is reported. Loads exceeding for size all expectation are reported rumbling over highways, and the state highway commission of Maryland points out that the millions that have been invested must be spent in vain unless states undertake to repair as quickly as they build. "It is a common sight," reports the Maryland commission, "to see loads rumbling over our highways now that would ordinarily wreck a city street. Our whole road fabric must be rent through if we continue to build and not to repair."

Several highways commissioners display marked uneasiness over the shortage of labor and freight cars for hauling road building material. They expect government aid.

Road funds include building and improvement of bridges, etc., but it is impossible to get an estimate on how much this phase will eat into the total. A tendency is manifest everywhere though to do away with the narrow road and construct only broad, firm bodied roads capable of heavy traffic.

Reports from state highway commissioners disclose some interesting indi-

vidual features.

In Oregon the government and state bodies are spending five times what they did last year in order to build trunk roads into large timber tracts. From these are being taken the woods for the

Road Expenses For Year Compared

	1917.	1918.
Alabama	\$150,000	\$2,500,000
Arizona	750,000	3,000,000
Arkansas	4,000,000	12,299,000
California	3,210,000	12,000,000
Colorado	3,100,000	3,635,000
Connecticut	2,500,000	2,500,000
Delaware	320,000	1,000,000
Florida	2,000,000	2,750,000
Georgia	3,500,000	4,300,000
Idaho	800,000	800,000
Illinois	5,500,000	17,000,000
Indiana	6,000,000	17,380,000
Iowa	15,140,000	15,500,000
Kansas	6,500,000	10,500,000
Kentucky	4,500,000	4,500,000
Louisiana	8,000,000	5,300,000
Maine	400,000	1,150,000
Maryland	2,250,000	2,700,000
Massachusetts...	4,500,000	3,083,000
Michigan	1,500,000	2,300,000
Minnesota	3,884,925	7,700,000
Mississippi	1,500,000	3,500,000
Missouri	2,500,000	4,000,000
Montana	2,000,000	3,000,000
Nebraska	3,500,000	1,279,757
Nevada	300,000	560,000
New Hampshire.	1,038,704	587,000
New Jersey.....	4,500,000	8,100,000
New Mexico.....	500,000	1,500,000
New York.....	7,000,000	10,000,000
North Carolina..	1,750,000	2,500,000
North Dakota....	1,000,000	3,500,000
Ohio	2,829,858	6,000,000
Oklahoma	3,500,000	6,400,000
Oregon	1,371,226	5,653,516
Pennsylvania ...	3,250,000	5,750,000
Rhode Island....	481,724	600,000
South Carolina...	1,173,000	1,498,000
South Dakota....	350,000	1,500,000
Tennessee	2,000,000	3,000,000
Texas	5,000,000	25,000,000
Utah	943,129	1,131,754
Vermont	485,000	685,000
Virginia	2,332,577	2,115,000
Washington	3,500,000	8,408,250
West Virginia...	8,000,000	14,000,000
Wisconsin	4,588,717	10,125,000
Wyoming ,	400,000	806,000
Totals.....	\$144,298,860	\$263,096,610

armada of ships Uncle Sam is constructing. In many cases roads have been planked by army engineers to enable the heavy trucks laden with mighty timbers to pass.

A. C. McKibbin of the Missouri state highway board writes that in forwarding to Washington reports on traffic areas in Missouri he gave first consideration to live stock, grain, poultry, mineral and timber producing areas. Into

these he recommended auxiliary and tributary roads should extend.

Iowa is entitled to the palm for consistent road construction. This state, with more automobiles in proportion to its total population, spent \$15,000,000 last year and is doing the same this year. Approximately 6000 miles of highways in the state are being improved and extended.

Recognition of the tremendous importance gasoline is playing in the war and in the sustenance of our automobile industry here is reflected in the figures from Oklahoma. Tulsa county, in the heart of the oil fields, is spending \$1,750,000, which is more than some states spent during the entire 12 months of last year. Another county, Okmulgee, is putting \$800,000 into 43 miles of road way.

Wisconsin is putting into effect a trunk system of roads which taps every community of the state. Much individual credit is due A. R. Hirst, one of the foremost civil engineers, for the installation of the road system.

Arkansas Triples Budget

Arkansas, which last year spent \$4,000,000, is investing \$12,000,000 in constructing a series of highways between Louisiana and Arkansas via Hot Springs and Little Rock.

Illinois and Indiana rank next to Texas in expenditures for road building. Indiana has inherited 175 miles of the new market highway and is also eager to polish up its share of the Dixie highway.

Texas' huge appropriation is not inflated by any large government tender. Federal authorities have given the lone star state just \$875,000, and the counties and state have gone out and got the rest.

"In addition," writes a highway correspondent, "there are 230,000 automobiles to be registered in the state this year at an average registration fee of \$8.32. Of this amount 50 per cent. will be returned to each county to be used in highway maintenance. The other 50 per cent. is retained by the state and after all operating expense is paid the balance, if any, will go into the state fund for roads and highways.

Ohio, Pennsylvania and Michigan, which play a large part in any highway program, owing to the fact that all government truck caravans traverse their confines are concentrating on those lanes used most by the big industries. Traffic between the huge rubber and steel cities of Ohio and Pennsylvania and shipping points will be uninterrupted in winter as well as summer. Plows are being purchased to keep open roads during winter months.

No startling increases in appropriations are reported from the East and New England states because highway commissioners there have never within the past decade allowed anything to interfere with a consistent road building program.

Ford Company Has Surplus of \$131,904,907

Over \$20,000,000 Added Last Year and
Plant Assets Doubled in Value to
\$25,637,959.

A report of the Ford Motor Co. to the State of Massachusetts for the year ending July 31 last showed a total surplus of \$131,604,907, an increase of \$20,000,000 over the previous year. The value of the plant assets or machinery and equipment doubled as compared with its value at the end of the preceding fiscal year, totaling \$25,637,959. The balance sheet shows under accounts payable an item of \$19,983,256, and \$5,952,902 is credited to accrued expenses and \$6,433,936 set aside for depreciation.

PRESENT DEMAND FOR CARS UNPRECEDENTED.

Great Spring Drive Is Underway, Says
Paige Sales Manager.

"The present demand for cars is the greatest and the most insistent in all my experience," reports Henry Krohn, sales manager of the Paige-Detroit Motor Car Company. "I have known some big selling seasons, but nothing like what we are now experiencing. The call for Paige cars is not coming from any special section of the country. The demand is fairly universal and there is no part of the United States in which the market is not active at this time.

"Last fall, after an extensive trip through the country and a close study of conditions, I predicted that the dull period which then prevailed would be followed by a rising market, which would develop into a great spring drive and I advised and warned our dealers to prepare for it. There were sound reasons for such a prediction. The present demand, however, is beyond anything that I anticipated and it has filled me with amazement.

"The reasons we gave last fall for the belief that spring would see a great demand for cars were big crops, high prices, consequent abundance of money among the farmers, and the general prosperity everywhere due to the placing in circulation of the billions raised for war contracts.

"With the return of confidence and business optimism the demand that might normally be expected has been increased by the addition of buyers who were in the market last fall, but because of the uncertainties that then prevailed postponed the purchase of a car.

"There is also this fact to be considered and we are just beginning to realize its full significance. The motor car is now an indispensable utility. In these days more than at any other time with the extra demands the war is making on us, time and energy must be conserved

so that everyone can increase his production to the utmost. The motor car has become a necessity and men of affairs find they cannot be without one. This realization of the practical utility and daily service of the automobile is a big factor in the present insistent demand.

"The situation has also been materially affected by the curtailment of production so that the probable shortage of cars combined with the excessive demand will doubtless result in creating two buyers for every available car.

"We are doing everything in our power to meet this situation and while freight conditions are bad, we are supplementing our regular shipments with daily drive-aways so as to get the cars to their markets as fast as possible. The Paige dealers who are co-operating with us are going to have their biggest year."

Paige-Detroit Co. Will Market Trucks

Well Known Automobile Manufacturers
Will Manufacture Full Line of
Commercial Cars.

The Paige-Detroit Motor Car Co., Detroit, Mich., has announced that it has entered the truck manufacturing field and that a line of trucks bearing the Paige name will be on the market before summer. A newly created factory organization and plant equipment will handle this new Paige enterprise and it is generally believed that this fact would indicate that the recent reported negotiations for the plant of the Signal Motor Truck Co. have been broken off.

BIG PEERLESS PROFITS.

Exclusive of munition contracts the net sales of the Peerless Truck and Motor Corporation in 1917 was \$18,924,451, which was an increase of \$5,399,428 over the previous year. After deducting interest and reserve for depreciation, losses and taxes, the profits were \$1,065,869, which amounted to 10.6 per cent. on \$10,000,000 common stock, as against 13 per cent., or \$1,356,358 in 1916.

STROMBERG PROFITS.

The net profits of the Stromberg Motor Devices Co. for 1917 was \$318,819, from which must be deducted the war taxes. This was an earning of \$6.37 for each of the 50,000 shares of common stock outstanding, and a gain of 83 cents a share as compared with the earnings of 1916. The company can produce 35,000 carburetors monthly. More than 25,000 instruments must be made each month to Aug. 1 to meet unfilled orders.

The De Luxe Automobile Co., St. Louis, Mo., has been made agent for Bethlehem trucks for that city and vicinity.

Pierce-Arrow Sales in 1917 Showed Big Increase

Gross for Year \$32,565,908, Against \$18,687,287 in 1916. Profits \$4,791,274
Against \$4,076,167 in Previous Year.

The Pierce-Arrow Co. reports a net income for 1917 of \$4,791,274, compared with \$4,076,167 for the same period of the previous year. The company's Federal taxes amount to \$1,161,802, leaving a balance of \$3,629,472. Net profits from this totaled \$3,598,748, from which preferred dividends of \$800,000 and common dividends of \$625,000 were paid. The balance, carried to the surplus account, amounted to \$2,178,748, compared with \$4,070,259.

After preferred dividends the balance of net profits was equivalent to \$11.19 a share on 250,000 shares of common stock of no par value, as compared with \$13.08 a share earned in 1916.

In his remarks to stockholders Charles Clifton, president of the company, says that the gross sales amounted to \$32,565,908, as compared with \$18,687,287 for 1916. This increase, he says, was due in large part to war orders from the United States and allied governments.

He says that in conformity with the desires of the government the output of passenger cars will be greatly curtailed this year, continuing on a moderate scale sufficient to supply the current demand and maintain the integrity of the sales organizations.

COMMERCIAL MOTORBODY CORP.

The Commercial Motorbody Corporation, with offices at 50 East 42nd street, New York City, which has acquired a plant in Detroit, is to establish similar warehouses and shops in Chicago and New York City, where it purposes to have large stocks of bodies of all types ready for shipment or delivery. These will be produced by different manufacturers and statement is made that about 400 different styles or types will be sold, affording quick service to truck agencies, branches and to buyers. The officers of the corporation are: P. H. Patriarche, president and general manager; Charles M. Eaton, vice president; Addison G. Brown, second vice president and assistant general manager; A. B. F. Harraden, director of sales; O. A. Huener, assistant director of sales; J. M. Cunningham, director of agencies and publicity; J. Greenway Bain, secretary.

William P. Barnhart has been appointed assistant director of sales for the United States Motor Truck Co., Cincinnati, O., and will be located at Washington, D. C., where he will also handle the business interests of the Stewart Iron Works, which is operated by the same men who control the truck company.

Activities of Prominent Men and Other

Harry L. Bill, formerly factory manager of the Chalmers Motor Car Co., has been elected to a similar position with the Winton Co., Cleveland, O.

W. O. Rutherford, sales manager of the B. F. Goodrich Co., Akron, O., has been elected a vice president of the company.

Harry Krause has been appointed assistant general manager of the Splitdorf Electrical Co., Newark, N. J., in charge of production. At different times in the past he has been connected with the Remy Electric Co., Stromberg Carburetor Co. and the Wire Wheel Corporation of America.

The Chevrolet Motor Co., New York, reports that there are 906 men from its various departments who are serving in the Army and Navy.

The Guaranty Securities Corporation at the annual meeting of the stockholders decided to change the name of the corporation so as to be more closely definitive of its function. After April 15 it will be known as the Continental Guaranty Corporation. This change of name involves no change of ownership or management. The corporation is now located in its own banking quarters at 244 Madison avenue, New York City, having moved from its original location in the Equitable building, 120 Broadway.

Harry F. Prescott is now sales manager for the Disco Electric Manufacturing Co., Detroit. He has had a varied experience in this country and abroad, including work for the Bullard Machine Tool Co., Locomobile Co. of America, and lately in district sales work for the Saxon Motor Car Co.

Philip E. Hawley has secured the New England distribution of Wilson trucks for the J. C. Wilson Co., Detroit. He is operating under his own name, with headquarters in Boston, Mass. Mr. Hawley was formerly of the Hawley-Cowen Co., New England distributor of Saxon cars.

G. G. Germaine, formerly with the Kawneer Manufacturing, has been appointed direct representative in New England of the Standard Parts Co., Cleveland, O.



W. O. Rutherford, Elected Vice President of the B. F. Goodrich Rubber Co.

Dr. A. N. Lawrason has resigned as head of the welfare department of the Reo Motor Car Co., Lansing, Mich., and will be succeeded by R. G. Grammel, who has had charge of the adjustment department under Dr. Lawrason.

W. A. Cluff has been elected first assistant treasurer of the Mason Tire and Rubber Co. and also has a place on the board of directors. He was formerly auditor of the company.

John S. Collins has resigned as sales manager of the Chevrolet Motor Co. B. J. MacMullen will succeed him as sales manager. He was formerly sales manager of the company at Fort Worth, Texas. J. W. Hawk will be the sales manager of the Texas branch.

C. N. Weaver, San Francisco, Cal., Studebaker distributor, has taken over all the territory of the San Francisco Studebaker branch. This includes Northern California as far south as Porterville and the western half of the State of Nevada. C. N. Weaver Co. has been distributor for Studebaker since 1913. Mr. C. N. Weaver, president of the company, was formerly an employee of the Studebaker corporation, having been connected with this firm for nearly 25 years. For several years before Studebaker began the manufacture of automobiles he was the manager of the vehicle branch at San Francisco and continued as automobile manager until he took over the dealership in 1913.

F. L. Shaw Co., Studebaker distributor at Dallas, Tex., has taken over the Dal-

las branch of the Studebaker corporation, with the exception of the New Mexico territory, which will be transferred to the Kansas City branch. F. L. Shaw has also been a Studebaker employee for many years, first as vehicle manager at Kansas City and afterwards at Dallas. In 1916 he became the Studebaker distributor at Dallas. His territory included practically all of the northeastern part of the State of Texas. His organization includes a great many successful sub-dealers and a retail sales and service organization in the city of Dallas. The taking over of these two branches by distributors, says Mr. R. T. Hodgkins, general sales manager of the Studebaker corporation, is not a precedent to be followed in the case of other branches. Studebaker still operates 18 wholesale branches in the United States and will continue its policy of branch organization as heretofore. The company still retains two branches on the coast, one at Portland and one at Los Angeles, and also a third branch at Salt Lake City. These two large distributorships, however, will operate under the factory and not through adjacent branch organizations.

A. P. Warner, president of the Warner Lens Co., Chicago, Ill., has been elected to the presidency of the Bailey Non-Stall Differential Corporation, Chicago.

George H. Graham has been appointed chairman of the Motor Truck Manufacturers' Committee of the War Industries Board, with headquarters at Washington, D. C. He is assistant to W. J. Foss, second vice president of the Pierce-Arrow Motor Car Co., Buffalo, N. Y.

W. D. Paine, eastern district sales manager for the Saxon Motor Car Co., Detroit, Mich., has resigned to accept a commission as captain in the Officers' Reserve Corps of the Ordnance Department, U. S. Army.

George Flynn, formerly sales manager of the Rajah Auto Supply Co., has been



Leo H. Bird, New President of the Chicago Automobile Trade Association.



J. F. Bowman, Vice President and General Manager of Acazon Motor Truck Co.

Personal News of Motor Industry in Brief

made assistant to the president of the Edward A. Cassidy Co. of New York City.

R. W. Lea has been commissioned a major in the United States Army and will take charge of the army wagon production at Jeffersonville, Ark. He was formerly trade manager of the Moline Plow and Tractor Co.

Ralph A. Cucullu is manager of the Cucullu Motor Car Co., the organization which has succeeded the O'Rourke Motor Car Co. at New Orleans, La. The company has the agency for Indiana and Vim trucks, the Troy trailer and the Haynes car. It has a large warehouse and also operates a repair shop.

A. W. Wyckoff has taken the distribution of the United States truck in Western Pennsylvania. He is with the Wyckoff Motor Sales Co. and was formerly distributor of the Chalmers cars, covering Western Pennsylvania territory.

C. F. Eminger has resigned the position of sales manager of the Splittdorf Electrical Co. of California and accepted the position of director of sales of the Dayton Electrical Manufacturing Co., Dayton, O. Mr. Eminger is the pioneer salesman of electric lighting and electric starters for automobiles, he having sold the first electric lighting and starting system on the Pacific coast for the old Apple Electric Co. of Dayton, O. The Dayton Electrical Manufacturing Co. will manufacture an entire new line of Ford starters and motor boat lighting outfits.

H. L. Innes, for the past year factory manager of the Chevrolet Motor Co., has been transferred to General Motors headquarters in New York. Thomas Houghton will succeed him at the Chevrolet plant. He was formerly with the Durant-Dort Co. and later with the Dominion Carriage Co. of Toronto, and the Tarrytown plant of the Chevrolet.

O. R. Arenschield has assumed the



T. E. Jarrard, Vice President of Apperson Bros. Auto Co.

duties of retail sales manager for the Overland Automobile Co. of St. Louis, Mo. He was formerly assistant manager of the Overland branch at Columbus, O.

L. S. James has been made manager of the newly organized truck department of the De Luxe Automobile Co., St. Louis, Mo. The company will sell the Bethlehem truck. He was one of the first truck specialists in St. Louis, Mo.

Arthur J. Hill, who has been managing director of the racing affairs of the Hudson Motor Car Co., Detroit, has been appointed general manager of the F. E. Stuyvesant Motor Co.

George Borland has joined the Simons Sales Co., Detroit, as representative on the road in Michigan. He was former Studebaker branch manager at Saginaw, Mich.

A. C. Leverton, formerly general superintendent of the Chalmers Motor Co. and factory manager of the Briscoe Motor Corporation, Jackson, Mich., has been appointed factory manager of the Federal Motor Truck Co.

E. R. Jacobi has resigned as chief inspector of the Reo Motor Car Co., Lansing, Mich., to become associated with the Mitchell Motors Co., Inc., Racine.

G. W. Inches has become purchasing agent of the Trego Motors Corporation, New Haven, Conn. He was formerly purchasing agent of the Briscoe Motor Corporation.

Paul T. Irvin, who has been associated with the Wells Brothers Co. and the Greenfield Tap and Die Corporation for 12 years, has resigned as sales manager of the gauge division to accept the position of general sales manager of Lincoln Twist Drill Co. of Taunton, Mass. Edward Blake, Jr., formerly of Wells Brothers Co., is vice president and general manager of this company, and

Frank O. Wells, president, and Frederick H. Payne, vice president of the Greenfield Tap and Die Corporation, are directors.

Jesse G. Vincent has been promoted to the rank of lieutenant-colonel as a recognition of his services with the War Department. He is stationed at Dayton, O. Lieut.-Col. Vincent was formerly on the engineering staff of the Packard Motor Car Co., Detroit, and was one of the designers of the Liberty motor.

J. F. Bowman has been promoted by the Acacon Motor Truck Co., Detroit, to vice president and general manager. He was for several years sales manager of the Federal Motor Truck Co.

H. A. Conlon, who was assistant sales manager with the Federal Motor Truck Co., has become sales manager of the Acacon Motor Truck Co.

Clifford A. Williams has been appointed director of sales of the Kissel Motor Car Co. Mr. Williams has had unusual merchandising experience, having served in an executive capacity in the directing of merchandising campaigns of a number of national successes.

John J. Cassidy has been appointed general manager of the Detroit branch of the U. S. Rubber Corporation, succeeding Albert H. Krum, who has retired from active business. He was formerly affiliated with the New York branch. Before associating with the U. S. Rubber Co., Mr. Krum was general manager of the Detroit Rubber Co., which he sold to the former corporation.

Gould Allen is now Detroit manager for the Wetzel-Hall Co., manufacturers' agent. He will take care of sales in the Detroit territory. For some time he was secretary of the Harrison Radiator Corporation and was formerly sales manager for the Fuller & Sons Manufacturing Co.



H. A. Conlon, Sales Manager of the Acacon Motor Truck Co.



Geo. H. Graham, Chairman Motor Truck Manufacturers Committee of W. I. B.

Big Used Car Show in Chicago

Second Annual Exhibition of Exchanged Automobiles Will Be Held in Coliseum for Nine Days

Chicago's Second Annual Exchanged Automobile Show, which will occupy the Coliseum for nine consecutive days, beginning March 30, is expected to outshine the initial effort of the Chicago dealers in staging a show of this character last year. Whereas only 40 spaces were sold last year, over 80 have been sold to date. A year ago only 75 per cent. of the Coliseum floor was used, while this year all of the main building and the annex also will be devoted to the show.

Car exhibits will occupy the centre spaces in the Coliseum, accessories will be located under the balcony and the Coliseum Annex will be devoted to trucks and truck forming attachments. The expense of the show this year already has been covered by the sale of space and a comfortable profit is now in the treasury, which, together with the sale of tickets and the further sale of space, will insure the return of a large part of the amount exhibitors pay for their spaces.

Chicago dealers last year staged the first real successful show of exchanged automobiles, and dealers throughout the country, as well as officials of automobile organizations, are watching this year's show with great interest. The various committees in charge of the present show are of the opinion that dealers in various cities throughout the United States will pattern future shows after this one.

There will be much of educational value in Chicago's Second Annual Exchanged Automobile Show, both for dealers and the public. For the former knowledge will be gained that an exchanged automobile represents a medium of trade which can and should show profits the same as the sale of new automobiles, and for the public will come the knowledge that exchanged automobiles represent assets rather than liabilities.

Every car exhibited or sold at the show will have its pedigree, so to speak, attached to it for the information of the purchaser. A mechanical inspection and appraisal committee, made up of expert automobile engineers, will begin its work March 15 and every one of the 1000 or more exchanged automobiles now in exhibitors' sales rooms will be inspected, tested and tagged before they are placed on the Coliseum floor for sale. The actual condition of every part of the car will be marked plainly for the purchaser's information, and in addition there will be information covering the make, style, model, motor number, number of cylinders, horse power, original list price and lowest sale price attached to every car. There will be no haggling over prices, the price marked being the

price at which the car will be sold. Virtually every make of car will be shown. As cars are sold they will be moved off the Coliseum floor and others put in their places. Whereas the aggregate sales at last year's show were \$181,345, it is believed that this year's sales will approach if not surpass the half million mark.

Besides the exchanged cars and trucks there will be exhibited new truck units, which will enable the owner to convert his passenger car into a one, two or three-ton truck. Also there will be shown portable garages, accessories and kindred lines, so that it may be truthfully said that this show will interest not only prospective purchasers, but those who already own cars, and dealers and garage men as well.

Special days have been designated by the entertainment committee as follows: Saturday, March 30, Chicago Automobile Trade Association Day. Monday, April 1, Women's Club Day. Tuesday, April 2, Automobile Owners' Day. Wednesday, April 3, Chicago Association of Commerce Day, Accessory Men's Day. Thursday, April 4, Chicago Automobile Club Day. Friday, April 5, Garage Owners' Day, Automobile Service Managers' Association Day. Saturday, April 6, Chicago Motor Club Day.

Music will be furnished by an orchestra and a pipe organ and a number of soloists have been engaged for the week.

Exhibitors at Chicago's Second Annual Exchanged Automobile Show are: Acme Body Works, American Auto Top Co., Anderson Electric Car Co., Arthur Jones Electric Co., Auto Cape Top Co., Auto Needs Co., Bailey Non-Stall Df. Corporation, Beckley Ralston Co., Bird-Sykes Co., Branstetter, H. P., Brown, Willson Motor Co., Carlsten Williams Co., Chevrolet Motor Co., Chicago Motor Car Co., Inc., Chicago Motor Club, Cook Co., R. G., Dashiell Motor Co., Dearborn Truck Co., Elgin Motor Car Corporation, Essenkay Products Co., Franklin Motor Car Co., Fowler Lamp and Manufacturing Co., Frady, Inc., Edgar C., Garford Motor Truck Co., Geyler Co., Gray-Heath Co., Greer Auto Co., Erwin, Harris & Rodgers, Thomas J. Hay, Inc., Harris Brothers, Haynes Motor Car Co., Hughey Motor Car Co., Johnson Manufacturing Co., W. R., K. & W. Rubber Co., Lange, Chas. H., Lang Brothers Co., Chas., Levy Motors Co., James, Locomobile Co. of America, McKay, H., Magnetic Motors Corporation, Markle, L. Co., Marmon Chicago Co., Mercury Manufacturing Co., Mitchell Auto Co., Newman-Stratton, Harry, Oakland Motor Car Co., Osgood Lens and Supply Co., Overland Motor Co., Paro Co., Post Machine Co., Paulman Co., H., Patterson & Co., E. W., Perry Auto Lock Co., Pan American Rub-

ber Co., Reo Motor Car Co., Chicago; Redden Motor Truck Co., Rue Motor Co., Root & Vandervoort, Schulko Motor Sales Co., Schuett Motor Car Co., Seng Auto Device Co., Service Motor Truck Co., Simmons Motor Co., Tennant Motor Co., Ltd., Thermoid Rubber Co., Triple Action Spring Co., Vesta Accumulator Co., Wilcox, Franklin & Co., Winston Co., The.

GREENFIELD TAP AND DIE PIPE TOOL CATALOGUE.

The Greenfield Tap and Die Corporation, Greenfield, Mass., has issued a new "Pipe Tools Catalogue," No. 38, which is a revised and completed edition of the first catalogue of this number which was sent out some time ago.

It not only contains a complete list of the products of the pipe tool division of the corporation with illustrations, but miscellaneous tables of information that make it a valuable aid to any mechanic or person in the trade.

JENKINS VULCAN SPRING GENERAL OFFICES ARE MOVED.

The general offices of the Jenkins Vulcan Spring Co., formerly maintained at St. Louis, Mo., have been moved to the new plant at Richmond, Ind. The greatly increased demand for Vulcan springs made it necessary to secure greater manufacturing facilities, and the new plant has already proved its capacity for an output exceeding anything in the past history of the company. The Richmond factory is not only larger than the old factory, but is equipped with the most modern spring making machinery and is located in close proximity to the supplies of raw materials which enter into the Vulcan product. The company has anticipated war conditions by laying in a large stock in all these lines of materials.

The Vulcan spring is immediately adjustable to any car and is a distinct and separate spring, which exactly replaces any make of spring on any make of car. Over 3000 dealers now handle the line. The company's Texas branch has been moved from 708 Commerce street, Fort Worth, to 209 South Houston street, Dallas. It is in charge of Messrs. Egan & Rhame.

FRUEHAUF TRAILER CO. HAS DOUBLED PRODUCTION.

The Fruehauf Trailer Co., Detroit, Mich., has increased its capitalization to \$150,000 to finance the expansion made necessary in its manufacturing facilities by the greatly increased demand for its products, which include a line of semi-trailers of one to 10-ton capacities. In the past two months the production of trailers has been doubled and the dealer organization is now being enlarged.

At a recent meeting of the directors the following officers were elected: President and treasurer, A. C. Fruehauf; vice president and general manager, Harvey C. Fruehauf; secretary and sales manager, E. L. Vosler.

MARMON PRICES HAVE BEEN ADVANCED \$200.

The Nordyke & Marmon Co., Inc., Indianapolis, Ind., have announced an increase of \$200 in the price of Marmon cars. The seven-passenger touring car and the four-passenger roadster list now at \$3750, the five-passenger touring car at \$3700 and the chassis with cowl at \$3450.

A. E. MALTBY HEADS PHILADELPHIA AUTOMOBILE ASSOCIATION.

A. E. Maltby has been elected president of the Philadelphia Automobile Trade Association to succeed J. H. Fassitt. Other officers elected are as follows: Vice president, Louis C. Bloch; secretary-treasurer, J. E. Gomery; directors, L. J. Eastman and J. H. Fassitt, in addition to the officers.

General Motors Will Increase Capital

Stockholders at Special Meeting Voted
to Increase Stock to
\$200,000,000.

At a special meeting of the stockholders of the General Motors Corporation, held at Wilmington, Del., it was voted to increase the capital stock to \$200,000,000. The new stock will be represented by \$50,000,000 six per cent. preferred and \$150,000,000 common stock.

The following directors were elected: P. D. Du Pont, A. G. Bishop, W. P. Chrysler, R. H. Collins, W. L. Day, H. F. Du Pont, Irene Du Pont, W. G. Durant, J. A. Haskell, L. G. Kauffman, J. H. McClement, C. S. Mott, J. J. Raskob, F. W. Warner and E. B. Linden. Five of the directors represent the Du Pont interests.

SCHOOL USED AS A RECRUITING OFFICE.

In the recent call for enlistments of aeroplane mechanics, a quota of 300 was asked from Detroit. Capt. M. C. Burnside went there to sign them up. Quarters being scarce the Michigan State Auto School offered a front office room, facing on Woodward avenue, for the purpose.

The campaign was successful in securing more than the number of men desired, as such campaigns in Detroit uniformly have been. Over 380 men went to Love Field, Texas, on March 20, to take up work at the Aviation Training Camp there. It is said that about 45 ground men are needed to every flyer in the service. Quite a little difficulty has been found in securing competent motor men. The recruiting office in the auto school interested the students and about 10 per cent. of the men accepted came from the auto school's classes.

Explains Reciprocity Measure

Senator Pittman Says Time has Come for Interchange in Road Travel and Transportation

Senator Key Pittman of Nevada, who has introduced an automobile reciprocity bill, which is practically a duplicate of the Adamson bill in the House, expects to obtain a report from the Interstate Commerce Committee in the near future on the measure.

He believes that it is particularly appropriate legislation in this war-time period when there should be uninterrupted road travel and transportation among the various states. In explaining the reasons for his measure he says:

"It has always been my belief that automobile registration had for its purpose the identification of the vehicle in order that its operator might be apprehended and brought to task if he failed to observe traffic rules in the various cities and states in which the motor car might be driven. Police authority can be exercised by means of the identifying tag no matter from what source it is obtained, but, properly, this should be from the home state, territory or district of its owner.

"It is not possible for all people to live in the central counties of a state, and in consequence many who reside in the border counties have occasion repeatedly to cross and recross state lines. To compel a citizen to go to the expense and trouble of taking out what are practically duplicate identifications is unreasonable and unnecessary and is essentially an interference with the inherent rights of the individual. In every European country a single registration number is sufficient, besides which one can secure at slight expense an international place of identity which makes it possible in peace times to cross and recross international boundaries with the utmost freedom. Previous to the breaking out of the war arrangements had been practically completed for an international trip which could be made by a single maximum payment provided for by the customs necessity in international travel.

"Since we have been taught by war time conditions to think and act nationally, I can't avoid a feeling that opposition to automobile reciprocity throughout the entire country cannot be based on any contention that one state might possess more improved highway mileage than another and, in consequence, the citizens of the lesser state should be called upon to pay an additional tax for traveling over the roads of the adjoining and perhaps greater commonwealth. New England has set a true example in this regard, for its several states reciprocate with one another in an exceedingly liberal manner and do not discriminate against little Rhode Island because of its size.

"I am hopeful that Congress will agree that the time has arrived when there

should be the most complete interchange in road travel and transportation by all sections of the country, wiping out completely any reference to state lines insofar as it refers to the comings and goings of some 5,000,000 self-propelled vehicles. Surely it is the duty of every state to provide its own arteries of communication, expecting, however, a reasonable cooperation from the Federal treasury in those big roads which connect up the states, one with another, until we have a complete network of roads, knitting together, as President Wilson so aptly puts it, 'the thought and energies of the nation.'"

COL. S. P. COLT AGAIN HEADS U. S. RUBBER CO.

At a reorganization meeting of the United States Rubber Co., Col. Samuel P. Colt was re-elected president. Other officers elected were: James B. Ford and Lester Leland, vice presidents; Homer E. Sawyer, in charge of footwear; Elisha S. Williams, in charge of mechanical division; W. D. Parsons, comptroller and treasurer; W. H. Blackwell, assistant treasurer; Samuel Norris, secretary; John D. Carberry, assistant secretary; H. B. Hubbard, assistant comptroller; W. O. Cutter, assistant comptroller, and George E. Smith, auditor.

The executive committee will be composed of Samuel P. Colt, James B. Ford, Lester Leland, Walter S. Ballou, Nicholas F. Brady and Charles B. Seger. The operation council will consist of James M. Dunn, chairman; Homer E. Sawyer, E. S. Williams, Ernest Hopkinson and Theodore Whittelsey.

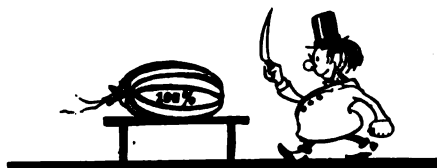
UNIVERSAL BATTERY CO. OFFERS COMPLETE SERVICE.

The Universal Battery Co., Chicago, Ill., is offering a battery service designed to meet the requirements of garage owners, service stations and supply men. Heretofore it has been necessary for the men in the trade to deal with a dozen different makers of batteries and battery parts in order to get supplied with the hundred and one parts which battery users are constantly in need of. This necessity for dealing with so many different makers has always resulted in a considerable loss of time and often confusion in the auto repair business.

The Universal Battery Co. claims that they have eliminated this unsatisfactory method, as they not only make and carry in stock complete batteries, but that they also have on hand at all times plates and parts for every battery for which there is a popular demand.



That the European motor car manufacturers are also enjoying prosperity despite the fact that they are making few automobiles, is indicated by the fact that the Rolls-Royce, Ltd., has issued a 100 per cent. stock dividend to its stockholders. Before the war Rolls-Royce shares sold at about \$13 a share, as compared with about \$19 at present, and the latter price is a quotation since the melon was cut. Ten per cent. dividends are now being paid on the common shares. In 1916 the company earned 41 per cent. on its capitalization.



A train of three-ton Riker trucks was sent from the plant of the Locomobile Co. of America at Bridgeport, Conn., to Washington, D. C., the 16 machines being intended for the service of the government, which is erecting the Walter Reed Hospital at Tacoma Park. The drive of 283 miles was made easily in three days. The trucks were designed for special work and had special equipment. The Walter Reed Hospital is to be very largely for the reclamation of men who have been so disabled by wounds that they must be taught trades and occupations that they may be self-supporting and be independent of charity. When finished it will be the largest hospital of the kind in the world.

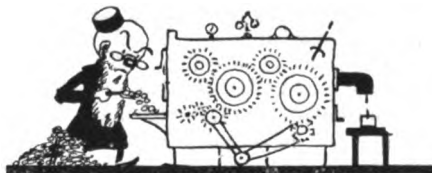
A Federal motor truck is now used by the general storekeeper of the Boston & Albany railroad at Springfield, Mass., for transportation about the yard for which a locomotive and cars had been utilized for years. Besides releasing the engine the truck is saving \$75 a month that was paid for trucking, and has practically obviated the payment of demurrage charges by hauling freights promptly between the Springfield freight house and the storehouse at West Springfield.

Daily airplane mail service between Washington, Philadelphia and New York, which has been planned by the Postoffice Department, and which is to be operated as special delivery of first class mail, will be inaugurated as soon as suitable fields for making landings have been obtained in those cities. There is reason to believe that trips will be made regularly about May 15 unless plans are changed.

A bill that will meet the approval of the state and power vehicle owners, which was agreed upon at a conference of state officials and representatives of motoring organizations, is soon to be introduced into the New York Legislature. The bill is to be general in its provisions and will specify the type of headlight that will best serve drivers and others using the highways.

Dr. Louis Clement who invented a substitute for gasoline through which he gained considerable notoriety some time ago when he announced that it could be made for about three cents a gallon, was recently given an opportunity in New York to prove his claims. The doctor was under arrest, charged with obtaining money under false pretenses, but before bringing him to trial the district attorney who had the prosecution in charge gave the doctor an opportunity to prove his claims. The test was held before a number of chemists and the district attorney. The former claimed that it would cost much more than 2½ cents a gallon, or even eight cents, to produce the fluid that Clement made in their presence. The fuel proved successful in operating two different cars, but it is claimed that of the 20 different ingredients which were poured into the mixture 18 were more costly than gasoline.

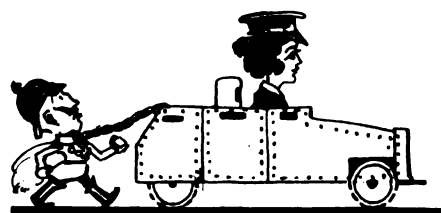
More than 300 employees of the Buick Motor Co., Flint, Mich., gave a dinner to 35 of their number who were to enter



the service of the government in different capacities, and among the speakers were Walter P. Chrysler, president and general manager of the company; Charles S. Mott, vice president of the General Motors Corporation, and Melnor C. Day, acting managing director of the Flint Chamber of Commerce.

Two trains of Packard trucks, consisting of 30 machines each and six Dodge cars, are started away from Detroit each working day of the week, each train being accompanied by a company of soldiers. The route is from Detroit to Toledo and thence over the main highways to the Atlantic coast.

A special session of the Wisconsin Legislature has amended the law of that state regulating the use of power vehicles on the highways, so that where machines are driven from factories in or out of the state to distributing dealers or to owners, no special license is required. This will preclude the necessity of special licenses and will save a great deal of money for those who would under the old law have to obtain the same authority required for those residents of



the state who use cars and trucks constantly on the highways.

Of the many organizations of women in New York state that have been formed to aid in war work none have taken up any more difficult work than the corps that is training with the armored motor cars that were formerly used by the New York State National Guard. The women have not only displayed great ability in handling these batteries, but the crews show every indication that should occasion warrant it, they could man these weapons of war and convince the enemy that they were on the job.

Capt. Charles G. Percival is editor of "The Bomb," a paper published occasionally during the life of Class 13 of the Motor Instruction Schools of the Ordnance Department, United States Army, which class is stationed for a period of instruction at Camp Herring at "Nashville," (otherwise Kenosha) Wis. The paper is largely given over to personal information and "hits" concerning the members of the class, so that its contents are best appreciated by them. These features are handled with the vigor and cleverness that have been characteristic of "Doc" Percival during his career as a newspaper and advertising writer, and made him known the country over.

Gustavus Sickles has been appointed sales manager for the Sullivan Motor Truck Co., Rochester, N. Y., and his headquarters is at 52 Osborne Terrace, Newark, N. J.

The Cadillac Motor Car Co. of Detroit has an ingenious method of overcoming most of the disadvantages of driving the cars over the highways for delivery. The highly finished bodies usually suffered more or less on these driveaways and many remedies were proposed to protect the cars, but none were as successful as that devised by the Cadillac Baltimore dealer. His method is to attach a frame work of light wood to the car and over it is placed an envelope, properly fitted. All parts of the car except the wheels and the front fenders are protected by waterproof material, which is held firm and taut by clips and cleats. The wooden frame prevents the envelope from rubbing the finish or coming in contact with it at all. Even the interior of the car is protected, as the envelope extends upward to the lower edge of the top.

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When the motor fire engines in Chicago arrived at the scene of a fire in a big hotel recently, the drivers and firemen were mildly shocked upon seeing a steady stream of young ladies attired in negligee garments issuing from the main entrance. There were about 200 of these lovely visions silhouetted against the glaring headlights of the engines, but under the circumstances they showed much less interest in the motor cars than they



do upon issuing from the stage entrance at earlier hours in the night.

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Vice President Robert S. Goff of the Bay State Street Railway Company in addressing the Massachusetts legislative committee on the street railway situation stated that the jitney business was cutting into the company's receipts to the extent of \$300,000 annually.

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Southern California, which has a climate said to be excellently adapted to rubber production, may possibly witness the development of a great rubber industry if the plans of certain rubber interests are carried out and prove successful. Several large tracts of land near Beaumont, in Riverside county, have been prepared for planting with Guayla rubber plants and similar tracts will be planted in other localities thought to be adapted to the purpose. The plants begin to yield the sap from which rubber is made in about five years and require little or no outlay for cultivation or care during that period.

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Since 1911 there has been an increase each year in the number of automobiles imported into the Philippine Islands according to a Custom House report, which states that at the close of 1916 there were 3013 automobiles, 392 motor trucks and 870 motorcycles in use. In addition



to this number there were also 1630 machines undergoing repairs.

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The Legislative Committee on Towns of the Massachusetts Legislature, which has had under consideration the bill presented to provide that a vote shall be taken by Australian ballot at a special town meeting of Nantucket on the question of whether the operation of automobiles on the island shall be permitted, has voted to report the bill favorably, which means that the fight will probably be resumed between the two factions, which was started in 1914. In that year at a special meeting it was voted to accept the state law which was passed to prohibit the use of automobiles on the Island of Nantucket.

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Motor car owners in New York City have been given an opportunity to show their patriotism through a movement started by the American Automobile Association to carry mothers and members of families of soldiers to Camp Upton, at Yaphank, by automobile. As the round trip fare by railroad is nearly \$3, the trip is practically prohibitive for most of the families and it is planned to have car owners who employ drivers register their cars with a committee which will use them in carrying persons to the camp free of charge.

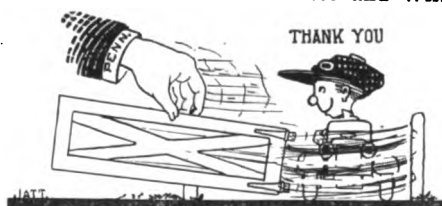
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A more extensive road building program is in view in Illinois than has ever before been considered. Illinois is making a determined effort to "pull out of the mud" this year. The cost of building the new roads contemplated in the state reaches \$3,000,000.

The most important improvement will be made upon the Lincoln Highway from Geneva to Fulton on the Mississippi river and on the Lincoln Highway feeder from Geneva to the City of Chicago. In furtherance of its purpose to establish at least one military road from coast to coast the Federal government has indicated the Lincoln Highway through Illinois. With the completion of several miles of concrete surfacing on the Lincoln Highway in Cook county, the route across the state will be practically completed by the end of the year.

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State Highway Commissioner of Pennsylvania, J. Denny O'Neil, during the course of an address at the annual banquet of the Lancaster Automobile Club, announced that the Lancaster and Will-

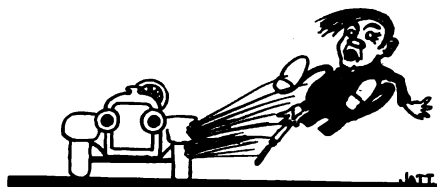


iamstown turnpikes had been contracted for by the department, which will make the highway between Philadelphia and Harrisburg toll free roads. The state and Lancaster county divide the cost equally.

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The Nordyke & Marmon Co., Indianapolis, Ind., started its first drive-away East on Saturday, March 16, when 42 Marmon 34s left the Indianapolis plant en route for New York City. A portion of the cars was delivered to distributors in Philadelphia and nearby points, but the main part of the cavalcade went to New York. In mere number of cars this was the largest drive-away that has ever left and it is one of the most important shipments ever made over the roads of the middle west and the Lincoln Highway. The list price of the seven-passenger touring cars and the four-passenger roadsters which composed the drive-away is \$3550, and the train accordingly represented a value of \$150,000 with the spare tires and other extras figured in.

The route to be followed from Indianapolis was the National Old Trails route to Columbus, O., and thence to the north to the Lincoln Highway, which was followed to Pittsburgh. From there on East the route continued on the Lincoln way, which is now used regularly by the Akron to Boston tire trucks of Goodyear and by the caravans of army trucks that are constantly going from middle west factories over the road to the seaboard.



The adage that "A shoemaker should stick to his last," is a wise and true one, as many jack-of-all-trades will testify, but "fools will enter where angels fear to tread." The latter axiom should more properly read in this case, "wise men fear a tread," as the facts to which we are leading concern a young engineer who having talked fluently and knowingly about automobiles, gained the confidence of a fellow worker, who entrusted him with the removal of a tire from an automobile. Being thoroughly versed in the laws of dynamics, physics and a strong right arm, he proceeded to the task with a screw driver, but apparently was deficient in pneumatics, as he failed to reduce the 80 odd pounds of pressure before proceeding. The first lift of the screw driver under the bead produced results far more wonderful than could be imagined according to the victim's own testimony.

"Something emerged from the gap quickly, rapidly assumed proportions of a Zeppelin and then burst with a crack as though it had been struck by a depth bomb, accompanied by a shower of stars," was the gist of his report.

When regaining his senses in a doctor's office with a hole pierced through his cheek, he admitted that he never knew the automobile was a thing so fearfully and wonderfully made.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration

Blood Brothers Machine Co., Allegan, Mich., has developed into one of the principal industries of that city. It is a concern that has always made a specialty of the production of universal joints for use in constructing the power transmission systems of automobile cars and trucks. The company was established at Kalamazoo, Mich., where it operated for a number of years, but in January, 1915, it was removed to Allegan, where the factory building now occupied had been erected expressly for its purposes.

The company was incorporated in 1904 and it has developed steadily with the automobile industry, its products being recognized as standards by all designers and constructing engineers. The prop-

This machinery and the added space will make possible a larger daily output of Essenkay products.

Andrew Kirkpatrick, vice president and secretary of **L. V. Flechter & Co.**, well known New York carburetor manufacturers, announces that a contract has been closed with the **Hurlburt Motor Truck Co.** of New York to equip the entire 1918 output with Flechter carburetors. The Hurlburt Motor Truck Co. first started with a capital of \$12,000 a little over four years ago. The company now occupy a Mammoth plant on Harlem river and Third avenue, New York, having unusual rail and water facilities for handling the big trade created.

The **Fruehauf Trailer Co.** of Detroit

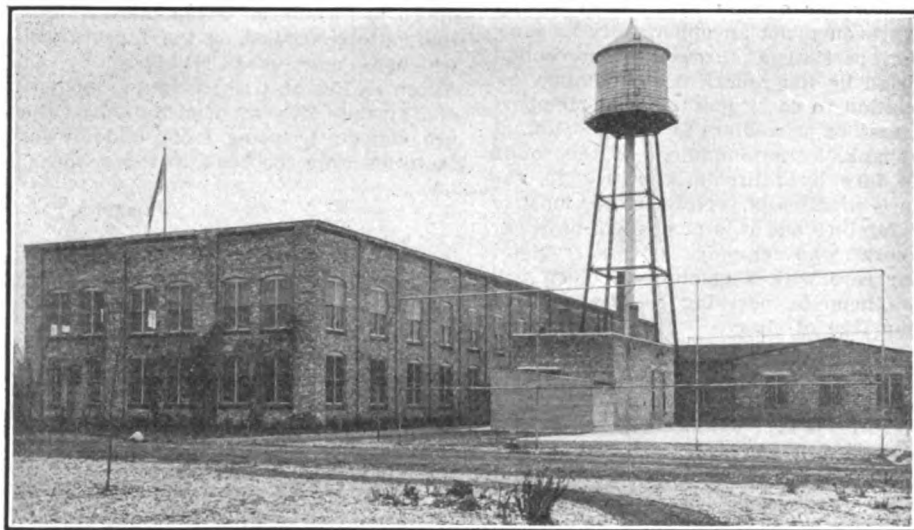
Va.; **E. L. Meredith**, Cambridge, Md.; **Messrs. O. Syska & Son**, 267 Flatbush avenue, Brooklyn, N. Y.; **Motor Car Co.**, Baltimore, Md.; **Overland-Knight Co.**, Newport News, Va.

The **Motor Products Corporation** reports net sales for the year ending Dec. 31, 1917, of \$9,633,082, which is an increase over the like period of \$3,153,506, or 48.6 per cent. The income account for the same period shows profits of \$537,527, dividends of \$233,333, surplus of \$304,194, previous surplus of \$3,715,616, total surplus of \$4,019,810, adjustment of properties to appraisal \$5848 and final surplus of \$4,013,962. The report in part is as follows:

"The outlook for the year 1918 is most encouraging, notwithstanding the almost certain falling off of the requirements of passenger car manufacturers. This has been anticipated and the officers of the company have spent considerable time in Washington endeavoring to secure orders from the government, in which they have been successful to the amount of \$5,500,000 in signed contracts with additional business under consideration. Orders have also been secured from responsible companies for production of finished product in a new field which conservative judgment is convinced will be permanent and which, upon completion, will amount to at least \$2,000,000."

The **Lee Rubber and Tire Corporation** for the year ending Dec. 31, 1917, reports a net profit of \$22,588 as compared with \$237,337 in 1916. The 1917 surplus amounts to only 22 cents a share as compared with \$2.37 in 1916 on the 100,000 shares of stock outstanding. Current assets as of Dec. 31 amounted to \$2,318,862, including \$155,959 cash, compared with current liabilities of \$1,150,910. **John J. Watson, Jr.**, president of the company, in his annual report makes the following statement:

"Net profits for the year are small, but extraordinary expenses have been met in the acquisition during the year of the selling organization of the company, which has formerly been independently owned, and the establishment of branches in the following cities: New York, Chicago, Boston, St. Louis, Atlanta, Indianapolis, Milwaukee, Buffalo and Providence. Particular attention has been given during the year to the manufacturing of a quality tire and in addition to the puncture proof and fabric tires the company is producing a cord tire which has been giving excellent results. Our sales department is reporting a good demand for our product and in many cases we are behind on our deliveries. The indications are that if shipping facilities permit us to make deliveries the present year should be satisfactory to stockholders."



The Plant of the Blood Bros. Machine Co., Manufacturer of Universal Joints, One of the Principal Industries of Allegan, Mich.

erty owned covers 3 1/10 acres and on this is one building having floor area of 21,000 square feet. The factory is admirably equipped with machine tools and every facility for economical production and the convenience of the workers. The number of employees is 150. The capital invested in the company is \$170,000.

The present officers of the company are: President, **L. H. Mattingly**; vice president, **O. S. Cross**; treasurer and secretary, **B. G. Urch**; directors, **L. H. Mattingly**, **F. I. Chichester**, **O. S. Cross**, **C. E. Carson** and **L. L. Thompson**.

The **Essenkay Products Co.**, Chicago, Ill., has been forced to obtain larger quarters in order to efficiently supply the needs of passenger car and automobile truck owners for Essenkay tire filler. After May 1 the company will occupy a modern constructed five-story building at 220-222 West Superior street. The mechanical engineering department has designed special machinery, which is now being installed in the new building.

has increased its capital stock to \$150,000 and the following officers elected: **A. C. Fruehauf**, president and treasurer; **Harvey C. Fruehauf**, vice president and general manager; **E. L. Vosler**, secretary and sales manager. The company are the manufacturers of semi-trailers of one to 10-ton capacities. The production of trailers has been doubled during the last two months and the dealer organization is now being enlarged.

H. B. Shontz Co., 157 West 54th street, New York City, distributor and central service station for the **U. S. Light and Heat Corporation**, Niagara Falls, N. Y., has appointed the following service stations for U-S-L batteries: **L. W. Ward Co.**, 9 Clark street, Paterson, N. J.; **Charles D. Murgatroyd**, Patchogue, L. I.; **Youngs & Co.**, Newburgh, N. Y.

The **H. J. Koehler Motors Corporation**, Newark, N. J., has placed the following agencies as distributors of the Koehler 1 1/4-ton trucks: **Capitol Motor Corporation**, 319 W. Broad street, Richmond,

The Hayes Wheel Co., Jackson, Mich., during 1917 made 978,324½ sets of wheels, or 3,913,297 wheels. This is an increase of over 1,000,000 wheels over the 1916 production of 2,732,264 wheels.

The Mohawk Rubber Co., Akron, O., has increased its capital stock from \$1,050,000 to \$2,050,000.

The Studebaker Corporation, Detroit, Mich., have increased the prices of the trucks \$100 each. The new prices are as follows: 1000-pound panel delivery, \$1085; express, \$1060; station wagon, \$1085; chassis, \$1040; one-ton stake body, \$1550; express, \$1500; 16-passenger bus, \$1700; chassis, \$1400.

The Pan Motor Co., St. Cloud, Minn., has moved machinery and equipment into factory building No. 2, which is a fireproof structure 624 by 170 feet. The setting up of machinery in this structure, one of the most up-to-date automobile plants in the country, was begun March 14. The northern part of the building only will be used for a few weeks until contractors lay cement floors and put the finishing touches on the remainder of the factory unit. Then all will be used. Officers and employees of the Pan Motor Co. are moving into the homes which were erected by the Pan Addition company as rapidly as the houses are being completed. More than 50 houses are nearing completion. About 90 per cent. of the Pan Motor Co. employees are subscribers to stock in the St. Cloud Manufacturing Co. The subscriptions were made voluntarily and presented to S. C. Pandolfo, president of the company, as a surprise. Excavation work for the erection of a \$500,000 drop forge building has been started and it is planned to rush this building to completion by July. All machinery and equipment for the building has been contracted for and the capacity is 1,000,000 forgings a month.

The Federal Motor Truck Co., Detroit, Mich., net earnings for the year 1917 were \$456,824, out of total sales for the year of \$6,005,246. This includes an allowance of \$225,000 reserved for excess profits taxes. Profit and loss surplus at the same date stood at \$698,328.

Nelson Brothers & Co., which has been making gasoline pumps and pump jacks in Saginaw, Mich., will enter the motor truck industry and is planning to launch the Nelson Brothers Truck Co., with a capital stock of \$300,000. The truck will be known as the Jumbo and will be manufactured in the former Saginaw plant, which has already been purchased. Machinery is being installed and active manufacturing will be undertaken in the near future. H. B. Nelson is vice president and C. J. Nelson is secretary and treasurer.

The Detroit Pressed Steel Co., Detroit, Mich., has received an order from the government for 19,000 steel wheels for the Signal Corps. It is expected to have the order completed by the end of May.

The International Motor Co., Plainfield, N. J., is erecting a four-story building adjoining its plant on West Front street. There will be 85,000 square feet of floor space in the annex, most of

which will be used as a factory and the remainder as a stock room.

The Edmund & Jones Corporation has declared the regular quarterly dividend of 1½ per cent. on preferred stock and 25 cents a share on the common stock, payable April 1 to stockholders of record March 20.

The Commerce Motor Car Co., Detroit, Mich., has received a government contract for more than \$2,000,000 worth of Commerce trucks. In order to carry the heavy inventory the company has authorized the sale at par of \$100,000 of treasury stock. This will be offered to stockholders in the ratio of one for every three shares held.

The Winther Motor Truck Co., Kenosha, Wis., has put in the hands of the government engineers for exhaustive tests a new type of quadruple drive motor truck designed especially for army service.

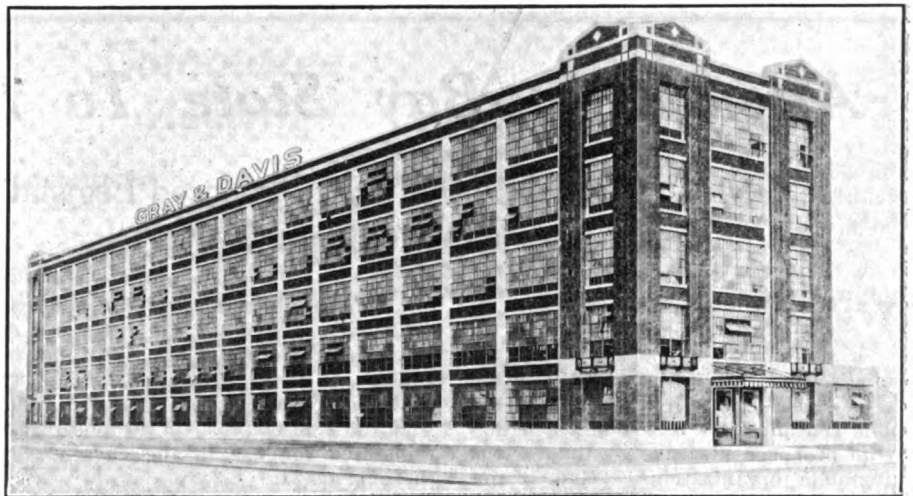
The Duplex Truck Co., Lansing, Mich., will increase its production to 300 trucks a month for the rest of the year.

The Tower Motor Truck Co., Green-

concentration of attention on government orders and shipments, with the result that the manufacturing schedule of motor vehicles was reduced and the plant rearranged on a war basis. Cost of financing operations increased and to carry the heavy surplus inventory investments the company obtained bank loans which reached a maximum of \$13,321,500, an increase of \$7,000,000 over the average of 1916. Before the end of the year this maximum was reduced to \$7,400,000.

The net income account and consolidated balance sheet, as of Dec. 31, 1917, compare as follows:

	1917	1916
Net sales.....	\$50,147,516	\$61,988,594
Mfg. costs, etc....	45,788,099	53,467,867
Oper. profits.....	\$4,359,417	\$8,520,727
Other income.....		90,518
Total income....	\$4,359,417	\$8,611,245
Interest, etc.....	298,488	
War taxes.....	560,188	
Net profits.....	*\$3,500,417	\$8,611,245
Preferred dividends	767,550	767,550



Big Plant of Gray & Davis, Inc., Boston, Mass., Manufacturers of Lamps, Dynamos and Starting Motors for Automobiles.

ville, Mich., has increased its capital stock from \$100,000 to \$200,000.

The Globe Furniture Co. of Northville, Mich., is now producing truck bodies mostly of the stake type. The company produces about three bodies a day.

The Paige-Detroit Motor Car Co., Detroit, Mich., increased the prices of its cars, which are as follows: Model 6-39, increased \$65 to \$1395; model 6-30 cabriolet, increased \$60 to \$1690; Standard Essex, raised \$55 to \$1830, and the Standard Larchmont raised \$55 to \$1950.

The Studebaker Corporation and its subsidiary companies for 1917 report total sales of \$50,147,116, which is \$11,641,078, or 24 per cent. less than the 1916 amount. Net profits declined from \$8,611,245 in 1916 to \$3,500,741 last year, a drop of 59 per cent. The net earnings for 1917 amount to nine per cent. on the \$20,000,000 common stock as compared with 26 per cent. in 1916. A. R. Erskine, president of the company, attributes the loss in gross sales partly to the unsettled conditions after America's entrance into the war, and partly to the company's

Common dividends	2,100,000	2,000,000
Surplus for year	\$633,190	\$4,843,695
ASSETS.		
	1917	1916
Plant, etc.....†	\$15,477,186	\$13,437,983
Goodwill, etc.....	19,807,277	19,807,277
Cash	2,528,555	3,196,703
Investments	847,672	1,142,004
Accounts and notes receivable	9,325,499	9,428,391
Inventories	21,322,134	21,477,657
Federal charges...	358,684	235,493
Total.....	\$69,667,007	\$68,725,549
LIABILITIES.		
Preferred stock...	\$10,965,000	\$10,965,000
Common stock....	30,000,000	30,000,000
Notes payable....	7,400,000	4,000,000
Accounts payable..	2,080,086	3,542,886
Advances	285,212	242,111
Federal tax res....	588,589	
Sundry credits....	543,389	1,964,694
Countr. reserve....	1,358,237	1,358,237
Special surplus....	2,548,654	2,548,654
Surplus	13,947,838	13,314,647
Total.....	\$69,667,007	\$68,725,549

*After \$767,550 preferred dividends there was a balance of \$2,733,191 applicable to the \$30,000,000 common stock, which was equal to \$9.11 a share.

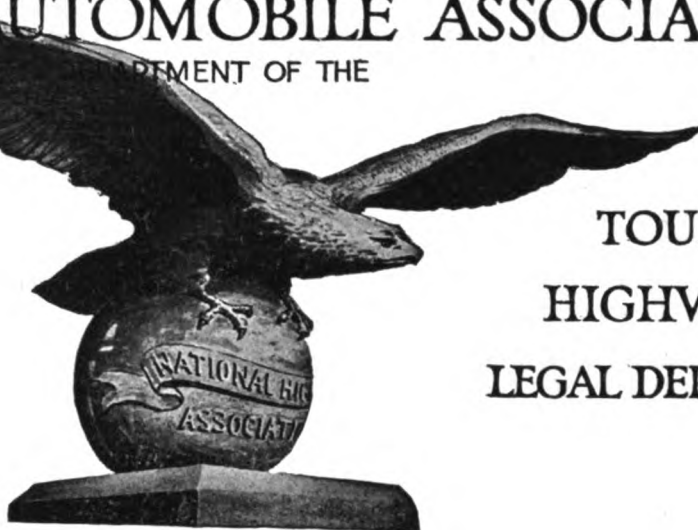
†Valuation after depreciation.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Attempt In Bay State To Surtax Owners

N. A. A. Took Stand That Proposed Legislation Was Unfair and
Directed Against Motorists As a Class. Bill Probably Dead

WITH the practical abandonment of its efforts to patch up the bill for a surtax on automobiles, the committee on taxation of the Massachusetts Legislature bowed to the will of public sentiment as voiced in opposition to the proposed measure by the various automobile organizations. Had it not been for this organized opposition against the proposition, the motorists would undoubtedly now be facing a further tax on the use of their cars and privileges.

The turning point in the matter came in favor of the car owners at the public hearing on Wednesday, March 13, in the State House in Boston, when the committee heard the numerous reasons why the petition of H. B. Endicott that temporary surtaxes be placed upon motor car owners and operators in the commonwealth of Massachusetts should not be granted.

The legislation as proposed is as follows:

An act to provide additional revenue by the imposition of temporary surtaxes of motor vehicles and operators thereof.

1. Section 1. For the purpose of providing additional revenue wherewith to meet the demands of the present war emergency, there shall be collected and paid into the treasury of the commonwealth for the current year the following taxes on motor vehicles and operators thereof in addition to such registration and license fees and other assessments as are already authorized by law:

On all automobiles registered for use

in the current year, except commercial vehicles and such as are registered by manufacturers or dealers, the following sums: \$5 if the registration fee now provided by law is less than \$15, otherwise the sum of \$10. On all motorcycles registered for use in the current year the sum of \$1.

On the first five vehicles registered by a manufacturer or dealer, the sum of \$5 and \$1 additional on each additional car registered by such manufacturer or dealer.

On each truck or commercial vehicle the sum of \$2.50 for each ton or carrying capacity.

On the license of each operator or chauffeur the sum of \$2.

1. Sec. 2. All taxes levied under the provision of section one shall be diminished by 50 per cent. to the extent that the vehicle is registered or the license issued after the first day of September in the current year.

Sec. 3. This act shall be administered and taxes hereinbefore authorized shall be collected by the tax commissioner, who may employ such additional assistance, clerical or otherwise, as the governor and council may approve. The Massachusetts Highway Commission is hereby directed to grant said commissioner such access to and use of its records as may be necessary.

Mr. Endicott was not present and was represented by Messrs. A. C. Ratchesky and James J. Phelan of Boston. The chief argument of these proponents was that it was absolutely necessary to raise

\$1,500,000 for state purposes; that many ways had been discussed by the members of the Public Safety Committee as to how this money should be raised and that body decided unanimously that a surtax be placed on motor vehicles, owners and operators for the following reasons:

First, that the machinery for collecting such taxes was already in existence, inasmuch as all owners and operators of motor vehicles were registered at the Massachusetts Highway Commission, and it would be simply a matter of taking the names and addresses and sending out the requisite bills.

Another reason assigned was that motor vehicle users did not contribute now sufficient money to keep the state roads in suitable conditions, inasmuch as they were the chief beneficiaries of good roads they certainly should not object to a further tax.

A third reason assigned, if it can be called one, was that every motor vehicle owner or user would be very willing to assume the tax as a patriotic duty.

The National Automobile Association and other opponents to this proposed legislation took the attitude that the bill itself was unfair and that the proposed method of assessing the tax was unfair. It was clearly explained to the committee that motorists do not object to any taxation provided the taxation was not directed against them as a class for purposes which was the duty of every citizen of the commonwealth to contribute to and because of the matter of con-

The Many Unjust Features in Act

venience in assessment and collection. It was pointed out that an assessment of an additional dollar or two dollars on the poll tax would contribute substantially the required amount, if not more, and would be a fair equalization of the tax.

No attack can be made upon motorists on the ground that they are not contributing towards the support of this commonwealth, for our automobile fees are as high as any state in the Union, and, in fact, there are some 13 states that have smaller registration and license fees than has Massachusetts. New York alone makes the payment of automobile registration fees in lieu of all taxation on the motor vehicle.

It is unreasonable to make a man owning a Ford or other small car who now pays \$10 as a registration fee, \$2 for a license fee for the first year and personal taxes of \$9 or \$10 on his automobile assume a special financial obligation of \$7 in addition. Not that he would object to paying any reasonable amount if all classes of society were taxed to raise the money needed, for the motorist has always shown great willingness to pay all fees whether exorbitant or not and to comply as well with hundreds of regulations that hamper and harass him in the course of his business or pleasure.

It must be readily apparent that motorists as a class for the privilege of being in a class pay more per capita than any organization of society in Massachusetts or elsewhere.

Motorists cannot be accused of unpatriotism for from the very start of our participation in the war thousands of cars were registered in this commonwealth subject to the call of state needs, many have been freely given to Y. M. C. A., Red Cross and other patriotic movements, the owners paying the upkeep while in use. Such a tax might defeat the very purpose for which it would be enacted owing to the small car drivers ceasing to operate machines this year and causing a great dearth of conveyances for war relief work.

Furthermore, the imposition of another fee upon chauffeurs, who now have to pay \$4 into the state treasury in order to earn a living would be incommensurate with the average earnings of these workers and would be class legislation of a most drastic sort against one of the poorest paid workers in the state, and the only class subject directly to the supervision by the state at their own expense. It seems absurd to single out one body of workers for taxation who have made nothing out of the war and allow others who have had their wages doubled and trebled on account of war time conditions, to be subject to no special contributions.

In addition the very method of estimating the tax is unfair. Small car owners pay \$5 and the large car owner pays \$10 regardless whether the automobile

is 30 horsepower or 90 horsepower. If such a tax went into effect it should at least be based upon horsepower or upon the cost of the vehicle. It is much more of a hardship for a small car owner to pay \$5 on his automobile and in addition \$2 on his license fee than it is for a wealthy car owner to pay \$10 and the same surtax on his license fee. Not only that, but it will make for dissatisfaction among the small car owners, for they will feel that not only have they been discriminated against as a class, but have been discriminated against in that class.

Never before has legislation been proposed that has as little pretext for enactment as this measure. The proponents of the bill violate the best traditions and principles of the state when they come out boldly and say that one class of the people must be taxed because they are the most "reachable" body of citizens in the commonwealth.

If there are officials who still think that automobiles should be taxed on the grounds that they are inimical to the public welfare, the voters should wake up.

National Highway Committee Meeting

Transportation is Naturally the Keystone to the Arch of Military Strength.

(Extracts from "Washington's Nine Months at War," published by Patriotic Educational Society, Washington, D. C.)

"As modern war has proved to be a war of industry, transportation naturally became the keystone of the arch of military strength.

"Upon invitation of Secretary Baker each governor of a state was requested to attend a conference to be held in Washington the first week in May, 1917. There were 10 governors and direct representatives of 38 others present.

"Practically every state represented in this conference was much interested in road improvement. Some had large appropriations for this purpose, others were discussing them. All wished to know what the Federal government desired. It was expected that there would be plans for a national road building campaign, insuring concentration of energy upon roads of national military or industrial importance and elimination of unnecessary construction. Did war needs necessitate special construction of roads or strengthening of bridges or changing of tunnels and culverts? All of these questions remained unanswered and the governors were left to use their own judgment. This was a problem which had received considerable notice in the public press, but yet had escaped the attention in Washington necessary for working out a centralized plan for war needs.

"A highway committee was appointed in November, 1917.

"Another transportation mechanism

Highways Needed For War Success

which has been sadly neglected by Washington is the motor truck. A vehicle capable of dodging congested districts and thoroughfares, able to sidetrack crowded terminals, should have received from the beginning of our transportation troubles persistent and profound study and application on the part of the men to whom the nation was looking to solve our transportation problems. Our transportation leaders are visibly the railroad men, but unfortunately most of them have limited their sense of responsibility to railroad transportation and have minimized the importance of the auxiliary services. It has long been within the power of the railroads to organize modern truck service in such ways as largely to solve that ever present difficulty, the congested terminal. Many of our cities are today crowded with trucks inefficiently used, which if organized under railroad leadership could greatly increase their usefulness and relieve not only the crowded streets, but also much of the congestion in our freight depots and yards.

"Unfortunately, it remains for private initiative to organize service, local, intercommunity and even interstate. This, however, is being done and through this private initiative such service will probably be ultimately harmonized with that of our established carriers. In similar fashion private initiative supported by the belated highway committee is obtaining improvement of important highways, involving application of state funds and doing the many other acts which our national emergency has forced upon the individual or state because the Federal officials did not rise to their opportunity.

"A ruling by the priority committee prohibiting railroads from transporting road building material is said to have been promulgated upon two or three days' notice. As a result several road building contractors were confronted with bankruptcy and work was immediately stopped on some highways which in two or three weeks would have been finished.

"Long stretches of road were rendered unusable because small sections were left uncompleted. The mechanisms needed for necessary highway construction were therefore seriously crippled, much of which could have been prevented had a few weeks' notice of the forth coming order been disseminated.

"France has already been saved by her use of roads. Great Britain and France both have considered their highways fundamental to war success, while America, amply forewarned, has failed to plan and has crippled road construction and maintenance.

"In some minds perhaps the railroads represent the only worth-while transportation mechanism, but adequate planning would minimize such serious misjudgment."

Trap Locations In New England

MASSACHUSETTS.

Boston—At the following places slow down and signal:

Commonwealth avenue, near Temple Israel, St. Mary street, Fairfield street, also at the junction of Washington street in Brighton.

Beacon street, at Berkeley street, Clarendon street, Joy street and junction of Commonwealth avenue, thence on

Massachusetts avenue, Belvedere street, Columbus avenue and Norway street.

Columbus avenue, between Dartmouth and Northampton streets, south of Northampton street in the vicinity of playground and car barn, drive slowly.

Tremont street, one-eighth mile trap in the vicinity of Keith's theatre, usually worked in the evening.

Allston District—Cambridge street and Harvard avenue; do not fail to slow down and blow horn.

East Boston—Speed traps are expected on Bennington street in the vicinity of Orient Heights.

Do not exceed 15-18 miles an hour; blow horn at intersecting streets and corners.

Arlington—Massachusetts avenue, at the junction of Pleasant street and Mystic avenue; do not exceed 15-18 miles an hour and blow horn.

Cambridge—Massachusetts avenue and Lake street; do not exceed 15-18 miles an hour.

Massachusetts avenue, in the vicinity of Porter square; do not exceed 15-18 miles an hour.

Somerville—Walnut street, do not exceed 15 miles an hour.

Revere Beach Boulevard—From the Fellsway to Revere Beach, thence onto Lynn, do not exceed 15 miles an hour and blow horn at curves and corners. Officers on motorcycles are arresting motorists for violating this law.

Charlestown—Main street, in the vicinity of city square, slow down and blow horn.

Bunker Hill street, slow down and blow horn.

Waltham—Main street bridge, Beaver Brook crossing; do not exceed 15-18 miles an hour and sound horn. South street, near Norumbega tower, at crossing and turns do not exceed 12 miles.

Wellesley—Washington and Central streets, keep to the right of intersection.

Winchester—At intersecting streets and thickly sections do not exceed 10-12 miles an hour and sound horn at all street corners.

Needham—At squares and intersections observe rules concerning the proper turning of vehicles, i. e., always keep vehicles to the right or middle of the intersection of the ways.

West Roxbury District—Walk Hill street; trap in the vicinity of schoolhouse and engine house; slow down and blow horn at Wachusett street and Wenham street.

Washington and Grove streets, slow down and blow horn, St. Ann's street bridge at Forest Hills square, motorists turning to left should sound horn and go to the right of the middle of the section of the ways. At Jamaica pond and entrance to the Arboretum motorists may expect horn and speed traps.

Dorchester and Roxbury District—Columbia road, near Devon street, slow down and blow horn; Blue Hill avenue, near Morton street, horn trap worked occasionally.

Brookline—Carleton and Beacon streets do not exceed 15 miles an hour and sound horn.

Milton—Police officer on motor vehicle patrolling Adams street from Milton station to Quincy square, also Washington street. From Quincy square to Fore River bridge do not exceed 15 miles an hour.

Our Letter Box

National Automobile Association,
9 Park St.,

Boston, Mass.

Gentlemen:—Enclosed I hand you my check for \$5 to renew my membership, which will expire on April 2 next. Kindly send the usual receipt or certificate and oblige.

I have found the membership in the association very satisfactory, particularly the information contained in the literature which you sent me from time to time.

Yours truly,

George H. Power,
National Automobile Association,
9 Park St.,
Boston, Mass.

Dear Mr. Power:—Acting on your advice I got in touch with the insurance company in regard to the settlement of the case and have made satisfactory arrangements so that they will not settle and my counter suits will be assisted by the company.

I am placing this whole matter in my personal attorney's hands, and trust that its outcome will be entirely satisfactory.

I cannot permit this occasion to pass without extending you and the association my sincere thanks for the spirit of co-operation shown, and be assured that no opportunity will be let pass in which a good word can be said for the association.

Again thanking you very kindly and with every good wish I am
Yours truly,

Swampscott—In the vicinity of Monument square motorists may expect speed trap at any time, owing to the alleged indifferent driving of operators of motor vehicles.

Lynn—Nahant boulevard, do not exceed 20 miles an hour; motorcycle officer.

Lowell—Pawtucket and Princeton boulevards, also Andover and Nesmith street, do not exceed 18 miles an hour and blow horn and slow down at corners.

Lawrence—Essex street, do not exceed 15-18 miles an hour.

Holyoke—Springfield road, do not exceed 15-18 miles an hour.

Haverhill—White and Arlington streets, Main and Locust streets, slow down and signal.

Concord—Towards the cemetery one-way streets are posted; motorists not observing signs will be summoned into court. Regulation slow down and sound horn at all intersecting streets.

Springfield—Do not exceed 20 miles an hour between this city and Riverside Park.

Gardner—Main highways and Chestnut street; slow down and blow horn.

Agawam—Main street, do not exceed 15-18 miles an hour and blow horn at all corners and curves where the operator's view is obstructed.

Attleboro—North Main and Park streets, do not exceed 12 miles an hour and sound horn; drive carefully through this section.

Beverly—Motorists should use more caution when driving through thoroughfare of this city. Slow down and blow horn at all corners.

Nahant—On Nahant and Lynn boulevards do not exceed 15-18 miles an hour.

Brockton—Warren avenue, motorists who exceed 15-18 miles an hour between intersecting streets and 10-14 miles at street corners will be prosecuted.

Methuen—Do not exceed 15-18 miles an hour on the principal streets and slow down and blow horn at all corners.

New Bedford—Speed and horn ordinances are expected on principal streets.

North Oxford—Do not exceed 15-18 miles an hour through this town. There have been two fatal accidents here recently.

Oxford—Do not exceed 15 miles an hour when going through this town, blow horn at street corners and curves where the operator's view is obstructed.

Palmer—Do not exceed 20 miles an hour and slow down at curves and corners.

Rockland—Slow down and sound horn at all intersecting streets.

Somerset—State road extending from the Dover line to the Rochester line, do not exceed 20 miles an hour and slow down at all curves.

Southbridge—Main street and all intersecting ways slow down and sound horn.

Ware—Do not exceed 15 miles an hour coming through the streets of this town. Blow horn at all curves.

Weston—Central avenue, do not exceed 15-18 miles an hour.

Weymouth—Officers on motorcycles; do not exceed 15 miles an hour between streets; slow down and blow horn.

Worcester—In thickly congested districts do not exceed 10-12 miles an hour; in approaching corners sound signal.

North Adams—Do not exceed 15 miles an hour between streets; slow down and sound horn.

Fitchburg—Lunenburg state road; do not exceed 20 miles an hour; be careful to slow down at intersecting streets.

Millbury—North Main street, West street, slow down to eight miles an hour and sound horn. Elm and Main streets, slow down and blow horn.

Spencer—Main street at intersection of Pleasant, Wall and Mechanic streets, slow down and sound signal.

Hingham—Traps for not blowing horn and overspeeding may be found almost anywhere.

MAINE.

Portland—State highways, police officers on motorcycles; do not exceed 20 miles an hour.

Waterville—Do not exceed 15 miles an hour through the streets of this town.

NEW HAMPSHIRE.

Manchester—At intersecting streets do not exceed 12 miles an hour and sound signal.

Nashua—On principal streets the police are enforcing a 15 miles an hour limit.

VERMONT.

Lyndonville—Do not exceed 10 miles an hour within the town limits, outside 15 miles an hour is permissible.

Randolph Village—Motorists must not exceed 15 miles an hour in the centre of this town. Non-resident motorists violating the law are subject to arrest on the spot.

RHODE ISLAND.

Tiverton—Main road near stone bridge, do not exceed 20 miles an hour; slow down and give signal.

Newport—Broadway, motorcycle officers; do not exceed 10 miles an hour, blow horn at obstructed corners.

East Providence—Do not exceed 15 miles an hour and blow horn at all corners and curves.

The National Highways Association

Pacific Coast Defense League

An organization has been formed on the Pacific coast for the purpose of promoting a system of national defense highways from the Canadian to the Mexican borders to prevent war and assure peace. The members are among the foremost business and public men of the Pacific coast and the organization which is known as the Pacific Coast Defense League, holds membership in the National Highways Association. A bill is now in Congress providing for the execution of an adequate system of military highways on the Pacific coast, and it is fathered by Senator Miles Poindexter of Washington and Senator John E. Raker of California. A convention is being planned, to be held in Portland, Ore., either in April or May.

The Pacific Coast Defense League is an eleemosynary organization incorporated under the laws of the State of Washington, with headquarters at 907-8 Lowman building, Seattle, Wash.

The league is supported by memberships and subscriptions from individual citizens and commercial organizations. Its purpose is to unite the people of the Pacific coast of the United States in an effort to secure more adequate defense of this entire section; to prepare, preserve and disseminate data and information showing the necessity of defense; to present information to Congress in every way possible in drafting and consummating defense plans, and to work for the protection of the commercial, industrial and social welfare of the Pacific coast.

Its main field of activity will be on the Pacific slope or in particular the states of California, Oregon and Washington, and the main objective at present is a survey and construction by the Federal government of a system of national highways on the Pacific coast that shall abundantly provide for the rapid and economic movement of troops, heavy ordnance and supplies; also to insure adequate facilities for the patrol of the coast by our airplane fleets.

The usual tourist or commercial highway will not suffice for the purposes of war. Military roads should be of greater width and be built to carry the heaviest modern mobile siege guns.

The league has already secured the support of the project from the senators and representatives from California, Oregon and Washington, and the legislatures of those states have each memorialized Congress asking for the early construction of military highways.

Present plans of the league call for an adequate system to consist of three north and south parallel trunk lines, together with laterals extending eastward from all ports, intersecting and opening

all important passes through the Coast Range, the Cascades and Sierras. These highways shall so far as consistent with military prudence follow lines of present highways development connect commercial centres and render accessible to the tourist the national parks within this area.

This system of highways as proposed for the defense of the Pacific coast as a "See America First" and national development resource, would annually be worth more than the first cost, but if this system of highways should at some time deter an enemy from waging war upon us or enable our armies to save our coast cities from the ravishings of war, mere mathematical calculation would fall short in its ability to tabulate its value as a national asset.

LACK OF TRANSPORTATION FACILITIES.

Although the coal production of 1915 was 650,000,000 tons, 50,000,000 tons more than the production in 1916, eastern harbors were crowded with vessels which could not move for lack of coal and on December, 1917, 200,000 car loads of freight were at a stand still within a radius of 300 miles of New York. This is about nine per cent. of the total number of cars in the United States, estimated at 2,300,000.

The eight days industrial shut down in 28 states saved 3,456,000 tons of coal, which cost industry \$239.35 per ton, or a total loss of wages and reduction of manufactures of more than \$1,000,000,000. In 18 leading cities each dollar's worth of coal saved cost labor \$9 in wages and employees \$23 in production.

From Jan. 17 to Jan. 29, when the order was withdrawn, 480 vessels had sailed, loaded with more than 2,000,000 tons of food, fuel, munitions and other supplies.

Because of lack of fuel, shipment of steel plates decreased 50 per cent. and projectile steel decreased 45 per cent. from Dec. 1 to Jan. 15. The upward trend was resumed the week ending Jan. 26.

Instead of the priority order prohibiting railroads from transporting road building material, a plan should have been adopted for the construction and improvement of highways needed to supplement the other transportation facilities of the nation and the facilities of the local road building agencies directed by government authorities.

Had the \$1,000,000,000 loss to industry been expended last fall under government direction in building necessary highways, and a national stimulus then given to the use of auto truck, fuelless days and industrial loss would have been unnecessary.

The motor truck is not only the logical means of making up for the deficiency in the railroad equipment that has been responsible for congested freight conditions, but is the only means available.

Military Roads Will Win War

Lack of transportation facilities is the limiting factor in the participation of the United States in the war.

Just as the government has taken over the control of the railroads, and the construction of the merchant marine as a war necessity, so it must take over the construction of such highways as are necessary to make the nation's resources available in the conduct of the war.

The war will be won with the conservation of resources and increased production.

Even the merest tyro knows that "In the business life of the nation the first set of acts is represented by transportation," it is one of the four principal forms of production.

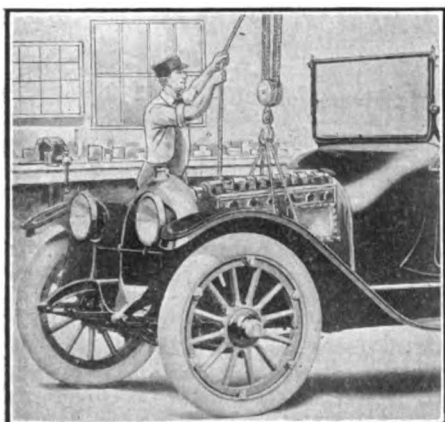
Conclusively the railroads cannot handle the nation's business, for before the war their capacity had been reached. The exports of the nation in 1917 were \$6,250,000,000; in 1915, but \$3,500,000,000. In 1917 the value of farm products, not including live stock, was \$13,500,000,000; in 1915 was but \$6,250,000,000.

This increase in commerce and the movement by the railroads of 2,000,000 men and their equipment is an accomplishment beyond belief. It is also a tax which must be continued and increased with the continuation of the war. Track and rolling stock cannot stand under the strain.

The rail transportation facilities must be supplemented by power vehicles on highways. The highways in their present condition are not dependable. The existing road building authorities are passe so far as additional road construction is concerned, as contractors refuse to bid on highway work, because of lack of labor and transportation facilities.

The Federal government alone is in position to construct new highways, which should be undertaken as a war emergency measure. It would not be sufficient, or even right, to attempt this emergency highway construction through the Federal road act and the medium of the state highway departments, as they are experiencing great difficulty in securing contractors, also little, if any actual construction has resulted from the Federal road act, in spite of the fact that the first money was available June 30, 1917, and the act was passed July 11, 1916.

It should be self-evident to most every congressman that the one crying need of the times is an adequate and well constructed system of highways to accommodate motor trucks connecting up all the large industrial and manufacturing centres with the various ports. Long ago the truck has proven its practicality as a long-haul carrier and as under war conditions expense is an almost negligible factor, its use will become general.



Overhauling *The* Automobile

SAXON SIX

This is the 18th of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The 19th article of this series will appear in the April 10th issue of the Automobile Journal.

IN CHASSIS detail the Saxon car with the six-cylinder Continental engine has been changed but little and is essentially the same in mechanical feature as when first placed on the market in 1915. The engine cylinders are of the "L" type and cast en bloc. The valves are on the right side and to remove them for grinding it is necessary to remove the cylinder head. The engine cannot be completely disassembled unless the whole power plant is swung clear of the chassis. This, however, is not necessary in ordinary overhaul.

Drain all the water from the radiator and refill with a strong solution of either potash or washing soda, which should be strained through a cheese cloth before being put into the radiator. Run the engine for about five minutes, or until the solution is fully warmed, then let the car stand for half an hour. Run the engine again until the system has thoroughly heated, then drain off the solution. This solution should be kept until after the engine has been reassembled and the process again repeated, care being taken after draining off the solution to refill with clean water several times until the entire cooling system is free of the solution.

For removal of the radiator from the car, disconnect the tie, rod, water hose and retaining bolts. The horn should next be removed, together with connecting wires. Disconnect all the secondary wires from the spark plugs and mark them with tags so that they may easily be replaced. Slip off the timer head and disconnect wires leading from the timer to the coil and remove this assembly from the car. Remove the castellated nut that holds the fan to the cylinder block and remove fan assembly from the engine.

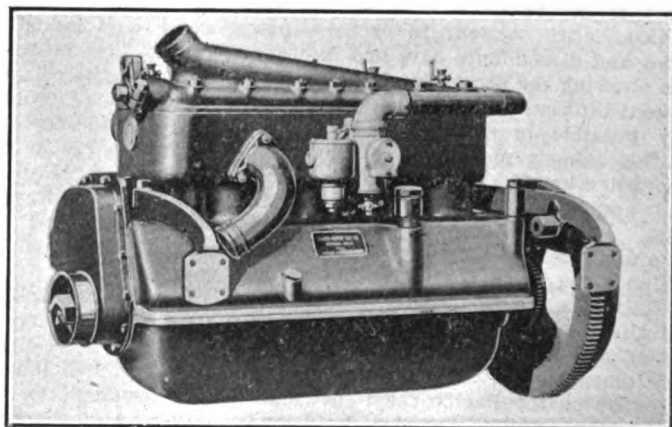
Next remove the 20 bolts that connect the cylinder head to the block and lift the head up. Care should be taken not to injure the gasket when removing the cylinder head. The plugs which fasten the cylinder head to the block may be removed by a wrench, care being taken to note the length of the plug, the longest being at the front of the engine. When these are replaced they should be coated with white lead to prevent water leakage into the cylinders.

Remove the cover plates on the right side of the engine. Hold the valve down from above, lifting the "spring washer" with a valve lifting tool and remove the retainer and washer, after which the valve can be lifted out.

Clean the valve, noting that the valve stem, as well as the head is free from dirt or gummed oil. Replace the valve in its seat and grind the seat by rotating the valve head with a screw driver or valve grinding tool, using grinding paste between the valve and its seat. Care should be taken in

keeping the grinding compound from working its way into the valve ports and cylinders. The grinding should be continued until an even bearing surface is obtained on valve face and seat. Remove all the grinding compound and wash the valves with gasoline, wiping off the valve seat in the cylinder when through grinding.

After reassembling the engine turn the flywheel until the exhaust valve No. 1 cylinder just closes and when this point is reached the valve tappet will readily turn under the fingers. At this point the mark "Ex. Cl." (exhaust closes) on the flywheel should be directly above crankshaft centre. If the closing is not correct, rotate the flywheel to bring this mark directly above the crankshaft centre and adjust the valve tappet so that it will just free itself at this point. The adjustment is made by loosening the lock nut and screwing the adjusting screw up and down. Turn the flywheel a short distance in the same direction, bringing the mark "In Op." (inlet opens) above crankshaft centre. With the flywheel mark in this position the inlet valve on No. 1 cylinder should start to open. If it does not, adjust the inlet valve tappet as



Left Side of Saxon Motor.

described above. Repeat the operation for each cylinder.

Turn off the gasoline at the tank and drain the fuel from the pipes at the carburetor. Disconnect the fuel line at the carburetor and also remove all the carburetor control rods. The intake and exhaust manifolds are clamped to the engine with four yokes and these being removed the intake, exhaust and carburetor can be removed. When adjusting the Rayfield carburetor, bear in mind that both adjustments are turned to the right for a richer mixture, as it is indicated on the adjustment screw heads. Be sure that the manifold connections are absolutely tight and free from air leaks and that openings are without sediment likely to obstruct the passage of gasoline. Always adjust the carburetor with the dash control down and the low speed adjustment must be completed before the high speed is touched. In adjusting the low speed with the throttle closed, close the nozzle needle by turning the low speed adjustment to the right about three complete turns. Open throttle not more than one-quarter. Prime the carburetor by pulling steadily a few seconds upon the

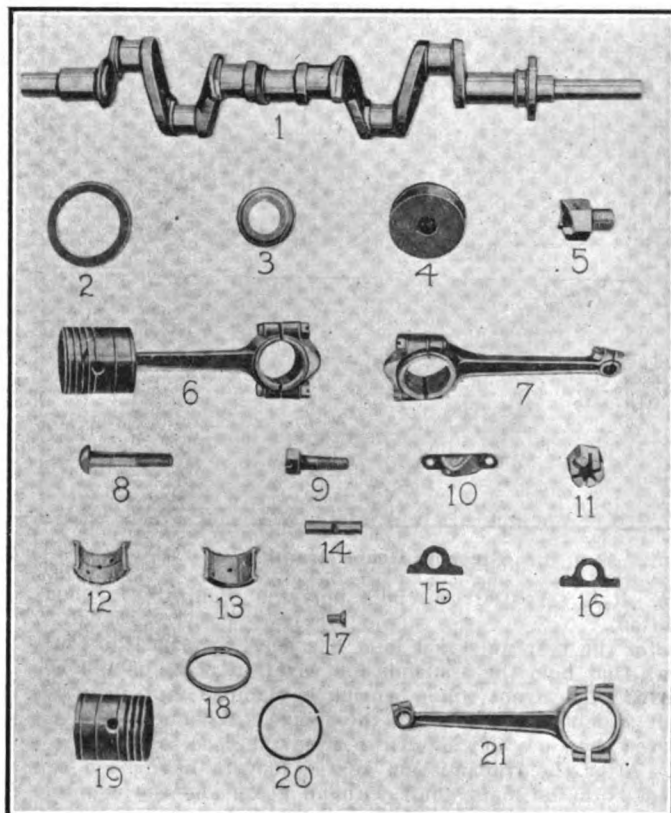
priming lever. Start the engine and allow it to run until warmed up. Then, with retarded spark, close the throttle until the engine runs smoothly without stopping. Now, when the engine is thoroughly warm make the final adjustments by turning low speed screw to the right a notch at a time until the engine idles smoothly. If the engine does not throttle low enough, turn stop arm screw to the left until it runs at the lowest number of revolutions desired.

In adjusting the high speed advance the spark about one-quarter. Open the throttle rather quickly. Should the engine "sputter" or backfire it indicates a lean mixture. This can be corrected by turning the high speed screw to the right about one notch at a time until the throttle can be opened quickly without backfiring. The adjustments cannot change.

After the oil has been drained from the oil reservoir the reservoir should be unbolted from the lower part of the crank case and given a careful scrubbing in kerosene. When this has been removed the crankshaft, camshaft, connecting rods and oiling system will be exposed. For ordinary adjustments the removal of one or more shims is sufficient to enable one to repair the connecting rod bearings. If the bearing is broken or badly worn, it may be removed through the lower part of the cylinder after the crankshaft has been turned to the right position. In putting the piston and connecting rod assembly to one side it should be marked so that it may be returned to the same cylinder from which it was removed. The cylinders should be carefully examined for scratches or scores and the necessary repairs made. In case of deep scores they must be repaired by the plating process or by welding, this necessitating the removal of the engine from the chassis.

The bearings should not be adjusted so tightly that the compression of a cylinder in good condition will not cause the piston to spring back when the piston is brought up against compression with the starting crank. Then when first bearing is properly adjusted loosen again and adjust the second and the others in the same manner, all bearings being loose except the one being adjusted. After adjusting all bearings singly, tighten them up as at first described.

The motor-generator, which is driven by the engine through a silent chain and sprocket from the crankshaft near the flywheel, is hung upon a bracket hinged so that the lower end can swing in a short arc for the purpose of adjusting the tension on the drive chain. This adjustment is regulated through an adjustment screw held in place by a check nut. Releasing the check nut the adjusting screw is free to be screwed in so that the necessary play needed to remove the chain can be obtained. The generator is removed by unhooking the bracket.

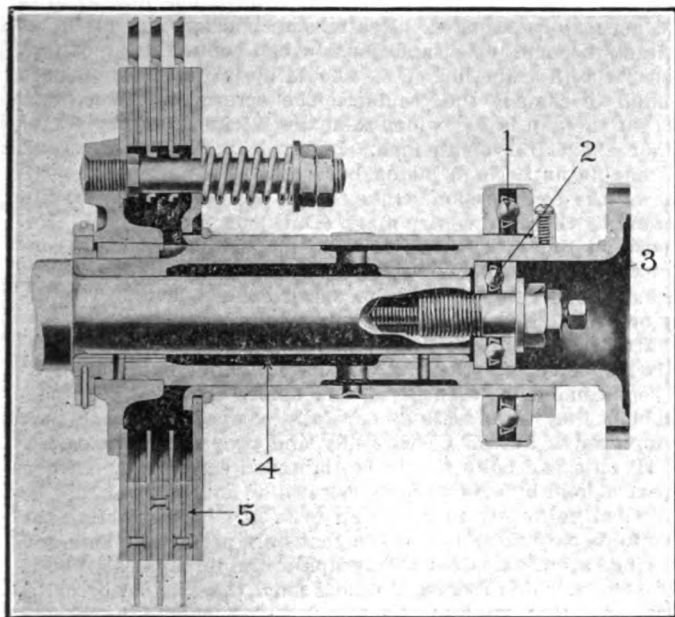


1, Engine Crankshaft; 2, Fan Pulley Belt Washer; 3, Crankshaft Thrust Washer; 4, Fan Pulley Assembly; 5, Engine Starting Crank Jaw; 6, Piston and Connecting Rod Assembly; 7, Connecting Rod Assembly; 8, Connecting Rod Bolt; 9, Connecting Rod Clamp Bolt; 10, Connecting Rod Dipper; 11, Connecting Rod Bolt Nut; 12, Connecting Rod Lower Bushing; 13, Connecting Rod Upper Bushing; 14, Piston Pin; 15, 16, Connecting Rod Liner; 17, Connecting Rod Bearing Retainer Screw; 18 and 20, Piston Rings; 19, Piston; 21, Connecting Rod.

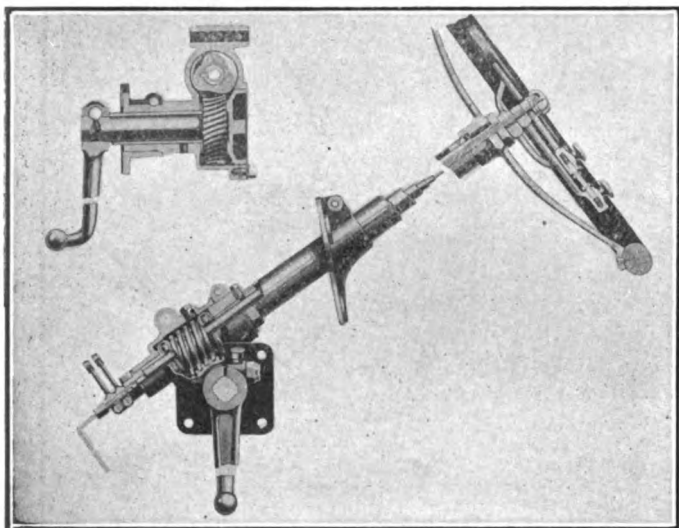
When the motor-generator is replaced care should be taken that the driving chain is not too tight. Swing the generator into place, replace the chain and take up on the adjusting screw just enough to obtain the proper tension on the chain. Care should be taken not to let the chain get slack. Tighten all the bolts and start the engine. If there is a hum or buzz it is an indication that the chain is too tight and in this case the adjusting screw should be screwed in sufficient to slacken the tension, after which the check nut should be retightened. After the adjustment is finished lubricate the chain with graphite and oil mixture.

The clutch is of the dry plate type, Raybestos lined, and consists of four plain steel plates and three with double facings of Raybestos, making six Raybestos surfaces. The Raybestos discs are driven from studs on the flywheel, and the steel plates are driven from studs attached to the clutch hub. When the clutch is thrown out these plates are allowed to separate, the Raybestos faced plates revolve with the flywheel and the steel discs remain stationary. When the clutch is let in the clutch springs force both plates together and the whole combination rotates, driving the propeller shaft. This clutch facing should be carefully examined for worn surfaces and all parts tightened and adjusted.

Although it is not necessary to remove the transmission and rear axle assembly from the car for inspection, it is more convenient to do so. When the nuts which fasten the transmission gearset to the rear axle have been removed the gear case may be drawn from the axle, bringing with it the pinion gear and propeller shaft assembly. There are two universal joints, one at the front and the other at the rear of the propeller shaft assembly. The rear joint is enclosed in a case which is fastened to the housing and to the propeller shaft. Removing the nuts allows the case to be slipped back upon the shaft, exposing the rear joint, which may be slipped



Clutch Assembly—1, Throw Out Bearing Assembly; 2, Hub Thrust; 3, Hub Thrust Bearing Retainer Screw; 4, Crankshaft; 5, Clutch Driving Plate and Clutch Plate Lining.

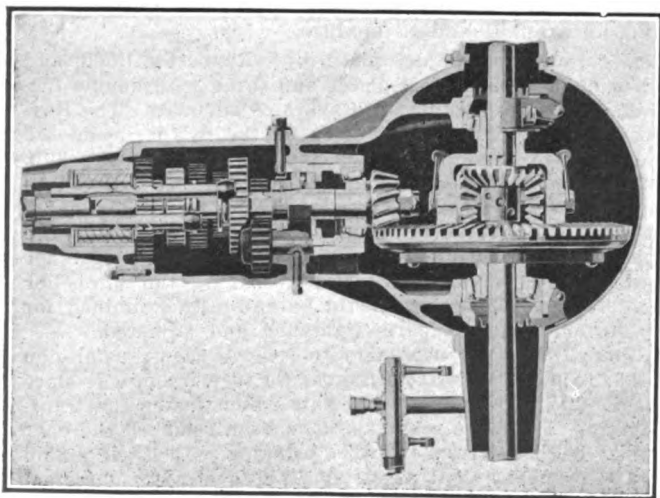


Steering Gear Assembly.

apart. It is essential that both universal joints be in good condition.

After the rear universal joint has been removed the four screws that hold the transmission cover in place should be removed. The front roller bearing is clamped into place by a bolt which passes through the flange. When the bolt is removed the race may be drawn from the case for examination. After the transmission gearset covers have been removed, both the main shaft with all gears and the counter shaft may be removed. The rear bearing race is held in place by a set screw and when the screw is removed the race may be driven from the case.

The rear axle is the three-quarter floating type, and it is unnecessary to disassemble the housing to examine the bearings and gears. Remove the differential cover plate and the nuts on the wheel flanges and when this is done the shafts may be removed from the axle. After the shafts are removed inside of the wheels will be found a large nut, which is kept from turning by means of a washer having a bent over lug. Straighten this lug and turn off the large nut. The wheels may then be pulled off and the roller bearings examined. The differential is mounted upon two roller bearings, the outer races of which are in two-clamp supports. The two supports are integral with studs, which extend through the front part of the housing and fasten the transmission gearset to the axle. With the supports removed the differential may be pulled through the hole at the rear. A careful examination of all the gears and mountings should be made. If the pinions show signs of wear or do not fit the spider they should be renewed or a new spider substituted.

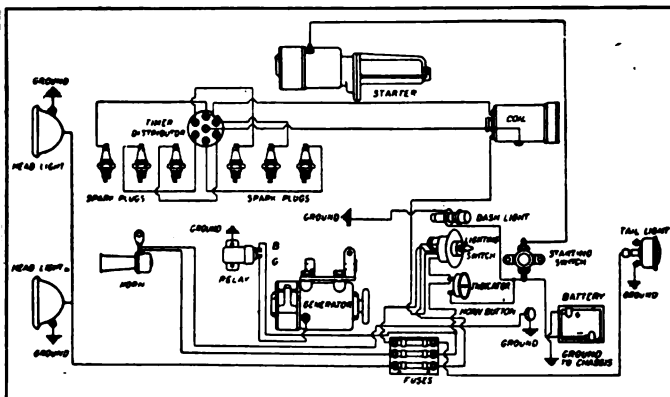


Rear Axle and Transmission Assembly.

After assembling the adjusting nut that is located on the outer edge of the right bearing so as to allow the master

gear to clear the pinion about $1/32$ of an inch. The adjusting nut on the left should be tightened until there is practically no play in the differential. The engine should then be started and with both wheels clear of the ground the high speed dropped in. The differential should run with little or no noise and adjustment made with the adjusting nuts until the gears are adjusted to the proper depth.

The steering gear is of the worm and worm wheel type. It is irreversible meaning that a shock or blow from a rut or stone cannot turn the wheel in the driver's hand. This will not require taking down, but observation throughout its length to see that it is properly lubricated is necessary. Fill the steering gear housing with heavy grease to lubricate the worm and worm gear and the upper and lower ball thrust bearings. Grease the cups over the steering arm shaft. If there is back lash or play in the steering column, take off the crank and put it on again at a point one-quarter the way around. This can be repeated two more times before the complete circle of the worm gear is brought into play. By that time the gear will have seen several years of service and will need new parts. If the steering wheel can be moved up and down it is certain that the ball thrust bearing must be taken up to prevent this end play. Loosen the bolt at the top of the housing which holds the adjusting nut and adjust by screwing the nut slightly into the case, continually moving the steering wheel to see that it is not tightened too much. This nut must be turned with a large wrench.



Saxon Wiring Diagram.

In the Saxon ignition the current is furnished through the Atwater Kent Unisparker. The timer requires very little attention and should not be tampered with unless something is wrong in the mechanism. The circuit breaker mechanism should be kept clean and with the contact points flat, parallel and accurately adjusted. If after much usage the platinum contacts become pitted and cause a bad contact, they can be filed flat with a fine file. Care should be taken to file off only enough to remedy the trouble. The screws are then reset so that the gap is not wider than the thickness of a piece of tin or about $1/32$ of an inch. In resetting the timer, crank the engine until No. 1 piston has passed its uppermost position on the compression stroke. This position can be readily located by the dead centre mark (D. C.) on the flywheel. No. 1 post on timer cap must now be in position to make contact with wiper. Rotate body of timer until contact breaker clicks. Then connect timer to spark control lever. The firing order is 1-5-3-6-2-4.

After the principle parts of the engine have been carefully inspected and all wear eliminated, either by adjustment or replacement of worn parts, and before the engine is reassembled, they should all be carefully cleaned. As each part is replaced it should be carefully and properly lubricated.

All nuts and bolts should be tightened carefully and when a part is held by several bolts, screws or nuts, they should be tightened uniformly to insure an even fit. In assembling the manifolds care should be taken that only perfect gaskets and packings are used. Coat with graphite the threads of all bolts and screws which receive the heat from the exhaust or cylinders. All that go into the water jacket should be coated with lead to prevent leakage of the water. It is also essential that all parts shall occupy the same relation to each other as before the removal for overhauling if the most efficient operation is desired.



BACKING OUT A BROKEN STUD.
(Fig. 399.)

Recently a repairman while working under a car twisted the head off one of the crank case studs. The stud was well set and could not be removed. Taking a drill he made a hole as large as possible without striking the threads, drilling into the centre of the stud. He then took a one-half-inch worn out square file and ground the teeth from it, tapered the end out to one-eighth inch square, making the taper about one-eighth inch to each inch. This done he drove the file into the hole and getting leverage with a light monkey wrench the broken stud was easily removed.

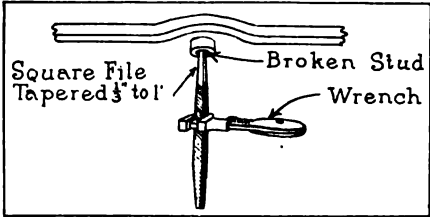


Fig. 399.

age by immediate repair. The accompanying sketch shows a very satisfactory piece of equipment that should be carried in every tool box and which is easily made.

This clamp can be placed upon the spring after the body of the car has been jacked up and it will render sufficient strength to the disabled spring to allow driving the car to a repair shop.

RUBBER MAT FASTENINGS.
(Fig. 400.)

The many who own Ford cars know the annoyance of having the rubber floor mat wrinkle and slide about, many times slipping around the speed pedals, where if becoming jammed in an emergency is liable to cause serious accident. As seen in the illustration this suggestion will be met with favor by the majority of Ford owners.

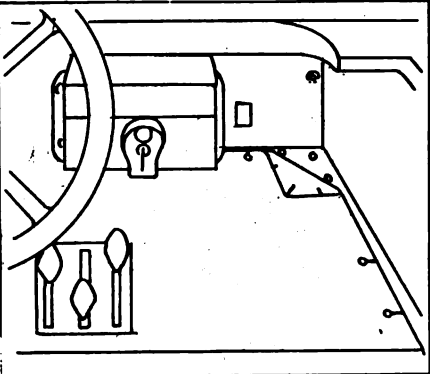


Fig. 400.

NOVEL WINDOW DISPLAY.
(Fig. 401.)

A mechanical device for window display if ingeniously constructed and bearing a point of mystery as to the source of its power, always proves effective in attracting the eye of the public and fixing their attention to the window, as well as fixing their minds on the name of the firm employing such a feature.

A square or circular hole is cut in the window flooring and a sheet of glazed glass inserted. Beneath the glass is a shaft to which a pulley and a round piece of board are attached. Upon the board are nailed four magnets at regular intervals and a belt running from the pulley to a small portable motor revolves the whole. The glass may be painted and scenery attached to imitate an automobile race track or circular road and four toy motor cars placed in position. The entire device is extremely simple to make and is very interesting to watch.

The mat should first be put in place, then tacked at regular intervals with a bead or button head heavy tack, after which the outside ends of the mat can be cut and notched with a pair of scissors, whereupon it will be found that thereafter the mat can easily be removed for repairs beneath the floor boards and will not wrinkle or look unsightly.

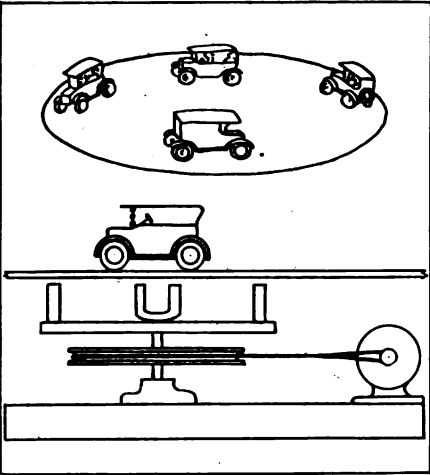


Fig. 401.

FIXING THE SPARK.

There is more science in the proper handling of the spark control lever than in the handling of the throttle, for the power, speed and gasoline consumption is to a great extent dependent upon the proper advance or retardation of the spark. It will pay one to spend a little time on a few experiments to determine the best spark setting for idling, power and speed on the lever, and when the different points are found, marking them. Select a hill for the experiment and with the throttle kept in one position run the car up the grade with the spark lever set at different positions a number of times until the hill is negotiated with the least engine effort. Then mark this point by screwing a small piece of tin in the shape of an arrow to the quadrant. In a similar manner find the best adjustment for low speed.

TEMPORARY REPAIR ON SPRING.
(Fig. 402.)

Quite often when on the road a car will break the top leaf of a spring. In most cars the top leaf of the spring has the most weight upon it, and it is therefore, important to prevent further dam-

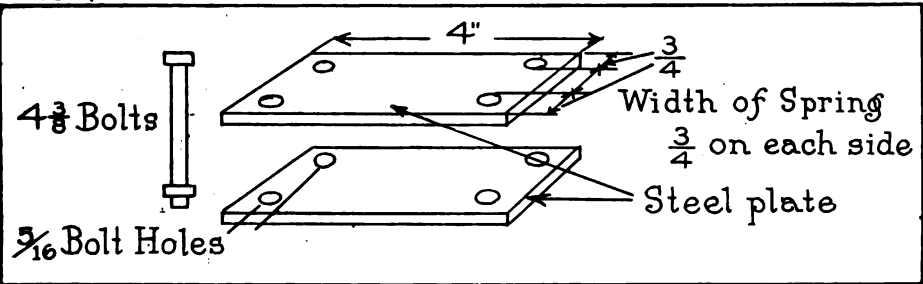


Fig. 402.

Preparing For the Spring Drive

By MRS. A. SHERMAN HITCHCOCK.

JUST what the motor woman would do had not some public benefactor conceived the sweater is difficult to say. Probably there would be other comfortable means for keeping warm chilly days and damp evenings. There is a strong prejudice nowadays against heavy underclothing, its place being supplied by outer garments, and the fact remains that motor women would mightily miss the sweater if it were removed as a possible clothing. It was the male creature who first created and wore this very comfortable garment and the first women who adapted it wore models like those of the men. Even now the slip-over models, which are among the most popular of the season, are decidedly reminiscent of the first sweater garments made for men. Of course they are not the shapeless garments of their predecessors, but are trim and becoming and in response to the demand the manufacturers of knitted goods have regarded this in the production of women's sweaters, which have gradually gained in attractiveness until now they are as smart and lovely as they are comfortable. The knitting craze has brought forth many hand-made conceptions in this type of garment—some of which have turned out to be good looking, while the great majority have been rather deplorable—but the American woman who is patriotic does not knit wool garments for herself and any gay colored wool in a knitting bag should be replaced exclu-



One of the newest spring motor millinery models is the "Fairfame." Made of silk poplin, this smart chapeau may be had in tan, green, taupe, purple, gray and black and defies the very strongest March winds.

(Courtesy G. H. & E. Freyberg, New York City.)



This "Navy Knit" model is very desirable for the motorist in every particular. Made of Shetland wool, in drop needle stitch, with collar and cuffs of Angora wool. There are contrasted shades in all the newest and most attractive. (Courtesy Navy Knitting Mills, Inc., New York City.)

sively by khaki and gray. In fact, any woman seen knitting a sweater for herself is certainly a subject of criticism, in view of the crying need for warm knitted garments for our men at home and abroad. The manufactured sweater is really far superior in fit and style to the one that is home made, and this season no home knitter can possibly hope to equal in any way the lovely weaves and smart styles to be found in the new models.

The sweater of Shetland is going to be the popular favorite and I am showing three of the best models of the year.



Both the smart new veil and the equally smart hat are thoroughly charming and practical for the motor woman. This style of veil affords ample protection for any ordinary driving and does not obstruct the vision in any way and the motorist who goes forth with this headgear may feel well assured that her appearance cannot be excelled. (Courtesy Herbert B. Lederer Co., New York City.)

The "Navy Knit" garment needs no word of recommendation to the motor woman who has already owned one of these excellently made sweaters, but to the undecided woman I can say that nothing better can be obtained. Their line of Shetland and fiber silk sweaters are among the leaders for quality and style. Great variety is shown in the stitches used and little original touches in pockets, collars, belts and sashes, cuffs and colorings give individuality and exclusiveness to their garments. The jacquard weaves are very beautiful and a novelty Roman striping in Grecian pattern is seen on collar and cuffs on some models. The "Navy Knit" sweaters come in rose, Copenhagen, corn, gold, purple, pink, Nile, salmon, peach, turquoise and all the newest and best liked shades. There are the slip-over models, emphasizing the new fishtail bottoms—which means ribbed from waist line to the bottom of the garment. Angora collars are seen on some of these models. There are a wide variety of the coat sweaters, some showing a decided ripple. The sailor collar and the shawl collar are equally good, some preferring the convertible sailor collar. Belts are arranged in many novel and effective ways and the tie girdle is very modish.

Sweaters will be worn without blouses for motoring this season, as well as for other sports. The Shetland slip-overs will be the approved garments for this use. It is particularly necessary in purchasing the sweater this year to procure a make of undoubted reliability. There are many wool substitutes put on the market in the form of sweaters, but the motor woman requires a warm and protective garment and must make her selection with discrimination.

Motor hose made of wool are imported from Scotland and are being featured



Every woman is interested in the new veils and here is one of the very newest and, incidentally, one of the newest hats appropriate for motoring. This veil is of the modish circular type and is chenille dotted. The prevailing colors in smart veils are taupe, brown, purple and black.

(Courtesy Herbert B. Lederer Co., New York City.)

strongly for touring in the mountain districts and for early spring driving in any section of the country. They are woven but have the appearance of being hand knitted, and come in very striking patterns. Some of the particularly modish ones are black with green checks, white with black rings and various colors having large diamonds in an over-shot effect.

Something new and decidedly practical for the woman who cares for her car is the Leatherette Aprotector. It is something in the overall type and is especially suitable for wear in the garage when Milady is doing a little tinkering on her car and would be of the greatest service if some little work was required on the road. It is very sturdily made and is equipped with fastenings that may be quickly adjusted to fit various dresses.

The new artillery red promises to be the leading color for motor millinery. This is due, no doubt, to the military fever, and khaki, Joffe blue, ambulance red, olive drab, lint and Pershing green all hold their own. All the lisiere materials, ribbons, fruits, small flowers and tiny wings will be used for trimming motor millinery. Tweed hats for the woman driver are new and smart and will fill many needed occasions. These hats are in a fedora shape, with one side folded over, and held in place with a strap and buckle. The crown and brim are stitched, so that while it is very light in weight it will not lose its shape. There are also smart little motor hats, made especially for the woman driver, of ratine, cheviot and Sammy cloth. The colors run mostly to greens, blues and grays. Worsted flowers are used in a moderate way on motor models and embroideries of floss are done in the same way. There is a little beige straw with a row of wool embroidered daisies in many colors,

With New Hats

Dotted Veils

and Sweaters



The Shetland Wool Middy Sweater is one of the smartest and best liked of all models. This "Navy Knit" sweater comes in all the newest shades. The deep sailor collar, sash and double cuffs are very modish, but it may also be had in the new deep throat style with a Dutch roll collar. (Courtesy Navy Knitting Mills, Inc., New York City.)

which is very attractive. The cocoanut straw is very popular for motor wear and chrysanthemum, chenille rope, twisted Angora braids and lisiere are decidedly modish. A motor hat is of artillery red cocoanut straw, made in turban shape and having a band of corbeau blue, while another smart model in cocoanut straw is of battleship gray with tiny lisiere flowers in artillery red as trimming. Motor hats must fit the head well and the new cocoanut straw is particularly adapt-

able. This straw is a fiber, which is grown in Africa, and its limberness permits the milliner to do much with it.

Veils for motoring are no longer the hideous things they once were. The smart motorist can alight from her car and go about the shops or elsewhere clad in correct attire, instead of being muffled like a mummy as was formerly the case. The present mode is for the circular and straight veil $1\frac{1}{4}$ yards long. They are chenille dotted or silk embroidered in various motifs and the indications are that this will be the style tendency throughout the season. A letter from Madame Georgette of Paris advises that the very newest in veils for motoring, as well as other wear, is the maline circular veil, worn on small, almost brimless hats. These veils are chenille dotted and velvet spotted, and the prevailing colors are black and taupe, then brown, and purple not quite so strong. Veilings by the yard may be had in the romage effects and large mesh hexagons. Motoring scarfs of chiffon will be in great demand for the touring woman. They will be worn to the waistline in many cases, falling from the back portion of the hat, and may be adjusted as the wearer desires.

In these days, when motor women are placing their wardrobes upon a war basis, materials, like all other things, must be well considered from the stand-



Practical, smart and becoming is this new motor model, called the "Witchtex." Made of pongee in a combination of plain and polka dotted, of a new and modish shape and exceedingly light in weight this model is ideal for the motorist. The crown is in tan and the polka dotted comes in brown, green, French blue, navy and black.

(Courtesy G. H. Freyberg, New York City.)



Isn't this a stunning sweater model? It is a "Navy Knit" model of sephyr wool, in full jacquard weave. There are novelty cross line stripes in a contrasting color, a full length sash and an unusually smart strapped effect in the back. It is made in all attractive shades.
(Courtesy Navy Knitting Mills, Inc., New York City.)

point of economy. There are, it must be remembered, both wise and unwise economies, and thoroughly trustworthy stuffs are the only absolutely safe investment. A motor dress or coat which will not survive a shower or which loses its freshness and shape after a few trips or becomes weather beaten in appearance from contact with dust after a few wearings are poor investments for any woman to make. To obtain materials, therefore, which are worth being made up and will give good service and an attractive and smart appearance, the motor woman must be well informed before buying.

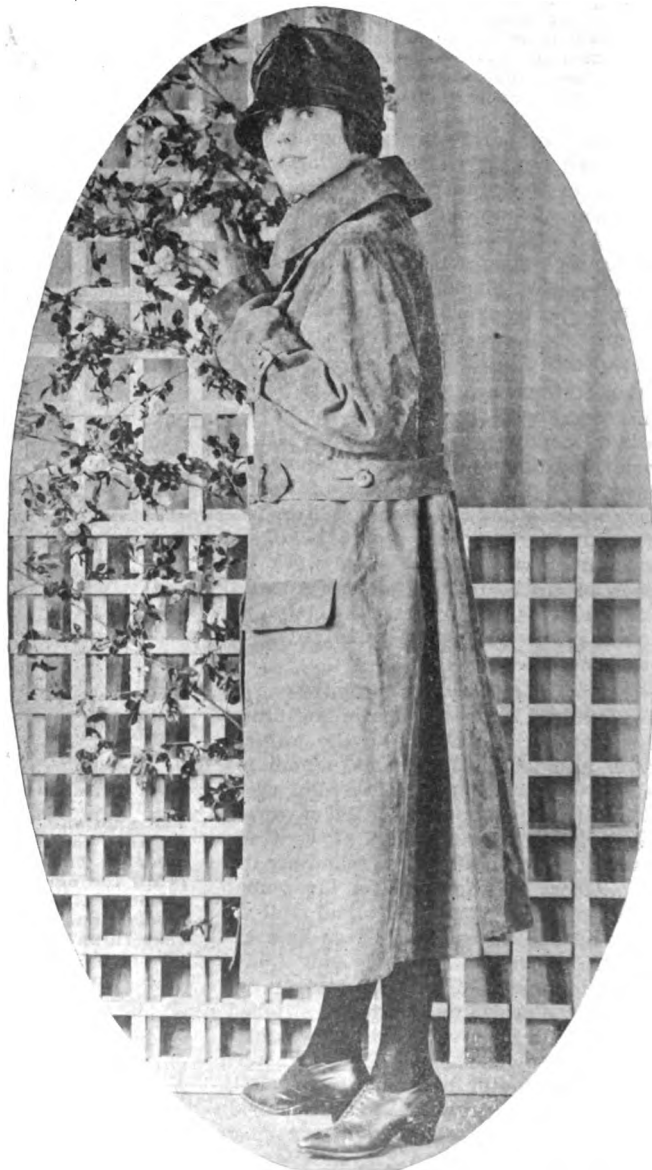
Among the leading materials that are above reproach and may be thoroughly depended upon to answer every requirement with absolute satisfaction are Sylvette, Mancho Crepe, Kitten's Ear Crepe and Chippendale prints. Sylvette is being much used at Palm Beach—a recommend which every discriminating woman readily understands. It is an outdoor silk having the general appearance and draping qualities of a knit fabric, yet it is a woven material which retains its shape admirably. Nothing could lend itself more readily, present a lovelier appearance or give better satisfaction for motor wear than Sylvette. For dresses,

coats, skirts and hats it is to be recommended. In colors, some of the most attractive for motor wear are pugaree, sisal, mastic, soldat blue, chinchilla, persimmon, brassie, putting green, orbit, oak leaf and golden brown. Manchoo Crepe has much firmness and body, while the texture is a soft, crepey effect and the colorings beautiful. There is a wide variety of blues in delightfully new shades, Militaire, Marine and Jackie being well suited to wear in the car. Pierre is a lovely soft gray, Fungus, Abeille, L'or, Prunelle, Columbine and Taupe are all most attractive. This material is particularly adapted for the motor dress and would make a stunning coatee. The Chippendale prints come in the bright shades, as well as those more sombre and have most attractive patterns. They are exquisite in quality and make one of the best wearing garments which the motorist can include in her wardrobe. A dress made of this material is not too formal for morning and quite formal enough for afternoon wear, so that it may be worn many hours of the day and is ideal for touring. If desired, war time informality will even allow it to be worn in the evening, so it is distinctly in accord with the principle of dressing sensibly. There is nothing for the motor touring trip that can possibly excel it. A silk garment this year belongs to the honorable legion of economic allies. America expects every woman to wear her silk coat and dress.

Gloves are one of the most important accessories of the motor woman and that they must give good service, have an excellent fit and be thoroughly up-to-the-minute in smartness and quality is well understood. The motor woman who is acquainted with the "wear-right" glove will be interested in hearing of the new models and the motor woman who has no knowledge of these splendid gloves should make their acquaintance. They carry the newest styles, both in conservative as well as novelty effects and at prices that are entirely consistent. There are the glace kid, chamoisuede and double-tipped silk in

shades of sand, gray, tan, champagne, white and black. The glace come with three and four-row embroideries, both self and contrasting. Some of the models have little hems on the top, black hem on the white and white hem on the black. In the silk gloves the newest models are called the "four aces." One is made with a striped ribbon effect and one clasp. The other two have contrast embroidery, self and black. The fourth model is made with side clasps. They are unusually handsome gloves and will give a decidedly smart touch to the motoring outfit, beside giving comfort and possessing the added advantage of washing well and retaining their original appearance.

Practical clothes for the woman motorist will be greatly in demand this year, as with thousands of men away, their wives, sisters and sweethearts will have to do much of the driving, as well as work upon their cars if they wish to enjoy them or use them in helping to win the war.

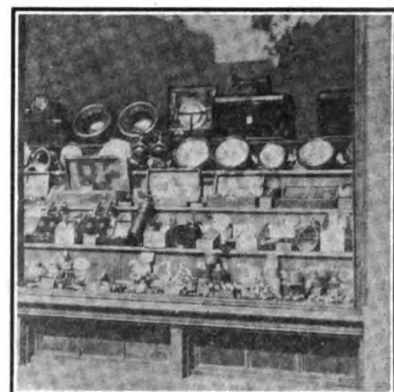


Very smart and up-to-the-minute are the new suede leather motor coats made in the new shades of tan and lined throughout with wool jersey. They are also very comfortable, protective and becoming. This model is embellished with buttons and buckles covered in leather.

(Courtesy Franklin Simon & Co., New York City.)



Accessories Department



IMPERIAL PRIMER.

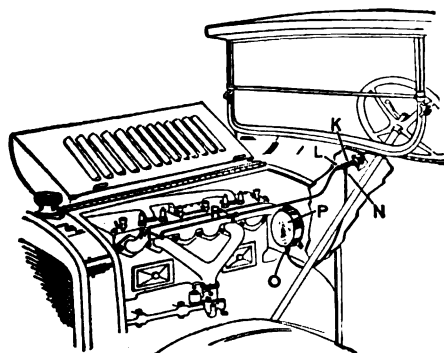
A device which is claimed by the manufacturers to do away with all starting troubles due to excessive and low temperatures, is known to the trade as the Imperial primer. This device is designed for practically any car and consists of an auxiliary or priming tank S, in which is carried a supply of high test gasoline, a priming pump K, which is connected with the manifold at one or more points.

One stroke of the pump plunger is said to force a finely atomized spray of fuel into the manifold, which furnishes the necessary vapor for the first two or three explosions; after which the engine is warmed enough to vaporize the fuel from the carburetor.

All tube connections are made by means of compression couplings, so that soldering, flaring, etc., are eliminated. The only change required in the engine is the boring and tapping of the $\frac{1}{8}$ inch holes in the manifold.

Though the best results are obtained when high test gasoline is used in the priming tank, low test gasoline may be used with satisfactory results.

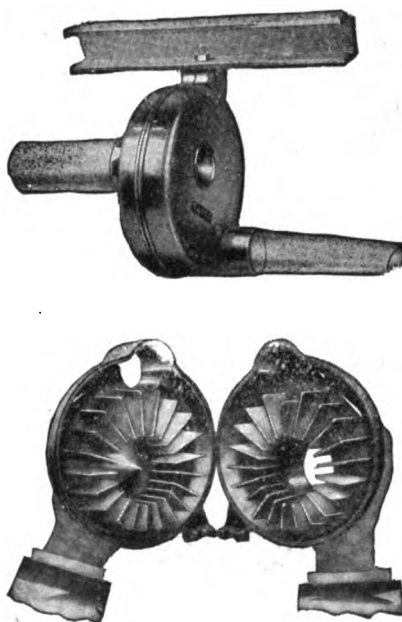
Manufactured by the Imperial Brass Manufacturing Co., 517 S. Racine Ave., Chicago, Ill. Price complete, \$6.



Imperial Primer Attached.

THE VACUUM MUFFLER.

The exhaust gases, as they come from the engine, are under a much higher pressure than the outside atmosphere and without a muffler they expand suddenly with a loud report. The method employed to silence this noise has been to liberate the exhaust gases suddenly from the small exhaust pipe into the



Outside and Interior View of Vacuum Muffler.

larger chamber of a muffler, where the force of the exhaust is lessened both by expansion and by leading the gas back and forth within the muffler until their velocity has died before final discharge into the air.

The Vacuum Muffler allows a direct charge through the muffler. The violent force of the discharge is deflected against a central cone and split up into numerous small discharges, each of which is separately expanded to atmospheric pressure. These discharges are delivered into the atmosphere with scarcely any noise. It consists of two parts made of cast iron, which are bolted together with three bolts with nothing to shake loose or rattle.

Manufactured by the Vacuum Muffler Corporation, New York City, N. Y. Write for prices.

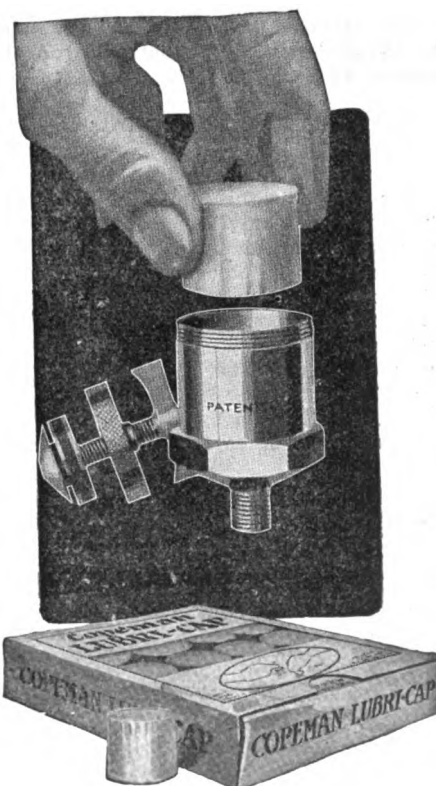
COPEMAN LUBRICATING SYSTEM.

From the beginning of the automobile industry engineers have been concerned with the problem of getting a lubricating system that would be satisfactory in the hands of the average motorist—yet 50

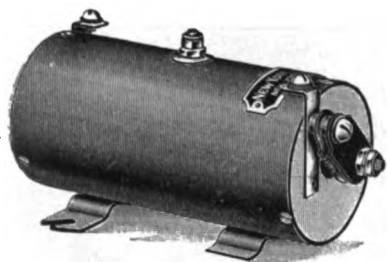
per cent. of all car noises are due to bearings worn loose on account of insufficient lubrication. The Copeman Lubricating System is a cross between a grease cup and a grease gun, which not only lubricates the bearings, but cleans them as well, according to the maker's claims. It puts the grease into the bearing no matter how much dirt or grit is clogging the channel.

The lubri-cap is a specially manufactured paper capsule with a tremendous tensile strength, containing high grade grease which is placed inside the specially designed grease cup, thereby forming an air tight grease chamber. It is simple to turn the screw and develop a pressure of 750 pounds to the square inch. The empty capsule is automatically removed by the plunger after all the grease has been forced into the bearing.

Manufactured by the Copeman Laboratories, Inc., Flint, Mich. Write for prices.



Copeman Laboratories Lubricating System.



NEW YORK TRANSFORMER COIL.

The inferior quality of much of the gasoline that is marketed today for use in motor cars has made imperative the use of the most efficient ignition systems in every respect, as without a very powerful and infallible spark it is practically impossible to obtain ideal engine operation. To meet this new requirement a specially designed spark coil has been placed upon the market by the New York Coil Co.

These coils are interchangeable with any supplied on all modern battery ignition systems. They produce a hot flame at all engine speeds on a minimum amount of battery energy. Operating on very low voltage they mean getting away from starting troubles that have been attributed in many cases to the inability of coils to supply a sufficiently powerful spark at the instant of starting, as at this time the starting motor's drain on the battery is so heavy as to reduce the voltage in many instances to four volts or less. The condenser is of the proper construction to insure long life of contact points in the distributor and they greatly lessen the spark at contact points in the distributor, thus making adjustment necessary only at long intervals.

Manufactured by the New York Coil Co., New York, N. Y. List price on all models, \$9 each.

SMITH AUTO SIGNAL.

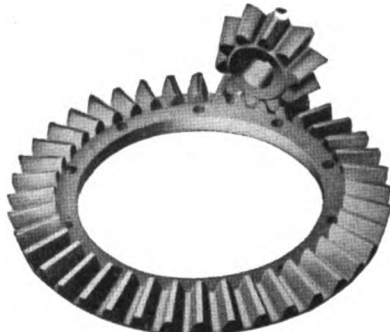
A practical and efficient automobile safety device is the Smith Auto Signal. One signal box only is placed on the left rear fender or mudguard (or panel or body in the case of commercial vehicles and trucks) by an adjustable nickel flange. This signal shows, left, right or stop on two sides, i. e., both to the front and to the rear. The left rear fender, as is easily seen, is the logical place for the signal, as it is seen by all cars following from the rear or cars approaching from

the front. This signal shows both night and day. It operates from left, right or stop only at the will of the driver, from a single handle, three-way switch attached to the steering shaft at the tip of the fingers, or in any other place most accessible to the driver. It indicates to the drivers in the rear what direction a machine ahead will take at an approaching cross road or junction before the turn is made, leaving no excuse for a rear end collision or accident caused by a car behind attempting to pass the car in front when the latter is about to make a turn. The Smith signal is not in the experimental stage, but is already in use on many cars and is giving satisfaction. The tell tale buzzer in the switch tells that it is performing its function. Each signal comes complete with switch, buzzer enclosed in the switch, sufficient weather proof wire, tape and staples for installation.

Manufactured by the Smith Signal Corporation, New York, N. Y. Price, \$17.50.

KROM-NIK GEARS.

The law of physics will not allow the moving of a heavy load without the proper gear reduction. Yet a large number of Ford cars are today used for heavy hauling. The standard gears are not designed for heavy work. The Krom-Nik Anderson Special Gear offers the lowest possible ratio for hauling and hill



climbing. It has a special type of tooth unlike any other and with an additional half pound in weight it gives remarkable strength and efficiency. The 4.2 to 1 ratio offers the lowest gear reduction possible in a Ford axle. The special racing 3 to 1 gears manufactured by this company are designed for owners who live in the country where they want extremely high speed for use in racing cars and are made of the same material.

Manufactured by the Krom-Nik Gear Co., Chicago, Ill. Price, \$12.



DOUBLE OUTLET Y PLUG SOCKET.

A unique and much needed device that has recently been placed upon the market by a well known firm manufacturing accessories is a two-outlet plug socket for automobile dashboards. Unlike the straight plug socket this plug is made in the Y shape, converting a single outlet into a double socket. By its use the owner converts his single dash lamp socket for two purposes at the same time, for example, one side of the plug may be used for spotlight and the other side either for an inspection lamp, regular dash lamp or cigar lighter.

This plug has a standard Edison type plug connection on one end, which can be plugged into any dash lamp socket and is neat appearing with the exposed parts nickel plated. It is made in double contact, single contact and double to single contact.

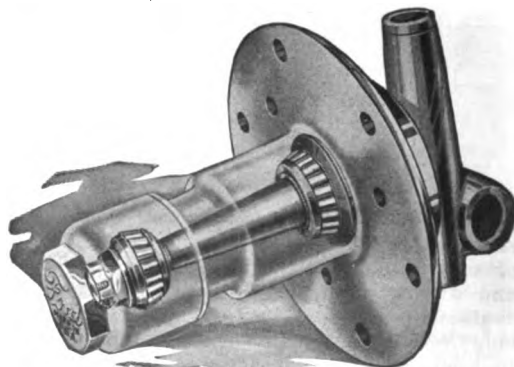
Manufactured by the Metal Specialties Manufacturing Co., Chicago, Ill. Write for prices.

WRIGHT ROLLER BEARING.

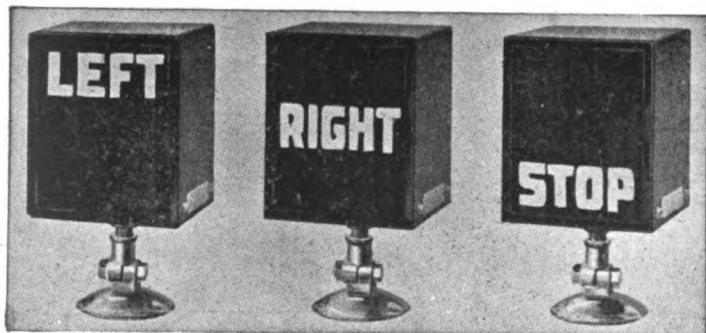
A roller bearing designed for the front wheel spindles of the Ford car, exactly similar to bearings now used for high class automobiles, is being put on the market by a well known company manufacturing roller bearings. This bearing is unique in that it has a cage or retaining mechanism to hold the rolls in the raceways, and it is thereby possible to use more rolls than the conventional type of roller bearing. The makers claim approximate increase of 50 per cent. in the number of rolls possible in the same size bearing.

This bearing has been designed because of the general tendency of engineers toward roller bearings for this particular point in chassis design. As shown in the accompanying cut, it fits the Ford spindle with no mechanical change and presents no more difficulty in installing than the replacement of the present bearings.

Marketed by the National Bearing Service Co., Philadelphia, Pa. Write for prices and literature.



Wright Roller Bearing Designed for the Ford Car.



The Smith Auto Signal That Shows Night and Day.



TELL-TALE PISTON RING.

There has always been more or less trouble from excess carbon formation and oil escapement into the explosion chamber of gasoline engines. To prevent this excess of oil leakage and to decrease liabilities of leakage past the pistons, the Tell-Tale Piston Ring has been designed.

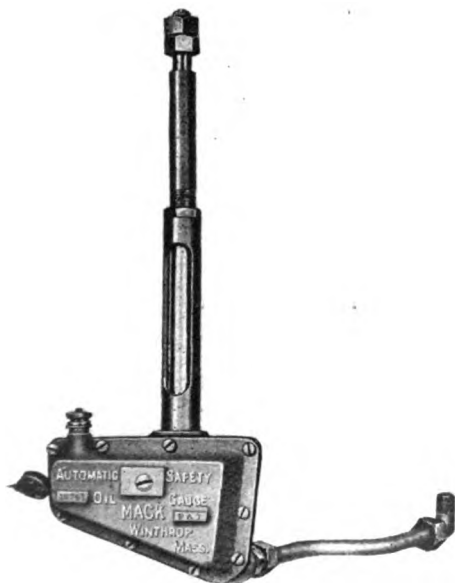
This ring is made of a metal which is capable of withstanding a great heat without losing its tension. Each ring is individually cast and retains its scale or resilient strength when finished. Around the outside is turned a shallow groove, or wiping chamber, that is designed to collect any surplus oil and allow it to escape into the crank case through vertical channels cut in the groove at intervals. The turned wearing surface enables it to seat itself more readily and it quickly becomes adjusted to any slight irregularity of the cylinder walls. The joint is of the familiar square lap type, in effect two rings but only one casting.

Manufactured by the Vulcan Machine and Tool Co., St. Louis, Mo. Write for prices.

AUTOMATIC SAFETY OIL GAUGE.

Lack of lubrication is one of the greatest sources of trouble in an automobile, causing scored cylinders, burned out bearings and injury to other moving parts. This will result in lack of power and a noisy engine, and eventually in a large repair bill.

The oil gauge on the side of the Automatic Safety Oil Gauge is readily seen and shows the amount of oil in the oil reservoir. If for any reason the reservoir fails to be filled or through a leak the oil is lost, this instrument will stop



Mack's Safety Gauge.

the engine before it reaches the point where lack of oil will cause serious damage. It is only necessary to add enough oil to the reservoir to bring it back to a safe lubricating point. This device works automatically and the makers claim it never fails to work.

This device is a complete insurance and one that a motor car owner cannot afford to be without. It insures the proper lubrication of the engine at all times, thus giving the full efficiency at all times. It can be installed in an hour's time without making any change in any part of the engine or car and once properly installed requires no attention.

Manufactured by the McMurray Specialty Co. Distributed by J. Stuart Ring, 14 State street, Boston, Mass. Write for prices.



MARTIN SEAT COVERS.

The one great trouble with seat covers is the difficulty encountered in putting them on, in having them fit smoothly and retain their smart appearance.

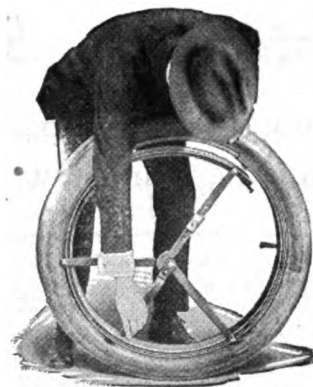
For this reason the Martin Seat Cover has been devised in a complete line from the cheaper materials to the more expensive kind, combining color and striped effects. This cover is easily fitted in a few moments and will give satisfaction and durability. The over lap at the back section takes ample care of any variation in upholstery and its flexibility relieves the strain upon fabric and fastenings. These covers save cleaners' bills and add a distinctive appearance to the car.

Manufactured by the Martin Manufacturing Co., Inc., Lancaster, O. Price, \$3. Ford Special, \$2.50.

THE LAWCO RIM TOOL.

Heretofore there has been no entirely satisfactory way to remove tires from rims. It is a task that requires from 15 minutes to two hours' time, according to the skill and ingenuity of the workman.

The Lawco Rim Tool enables anyone to remove a tire from any demountable transversely split rim in a minute or less. The tool is easy to adjust, easy to attach and will give quick results. As



Lawco Rim Tool.

shown in the illustration this rim wrench is simply a set of claws that can be hooked over a rim and contracted by the simple motion of a lever. After the tire has been fixed it can be put back on while the rim is still in the grip of the tool. A toggle or reverse movement of the lever expands the tool and the rim as much as may be necessary to cause the ends to meet and permit latching. This tool also can be used to break open any sort of latch. Breaking the latch is done with an expansion movement performed by a single slight movement of the lever. The tool is made of forged steel and is strong and simple in design.

Manufactured by the F. H. Lawson Co., Cincinnati, O. Price, \$3.50.

ADAMSON VULCANIZER.

An entirely new and improved feature in portable vulcanizers is the use of the new dry fuel in the Adamson model "E" outfit for repairing tire punctures. It consists of a powdered dry fuel, which when poured from the measuring cup into the receptacle and ignited burns with a hot glow without flame, vulcanizing the patch permanently. The outfit includes vulcanizer, can of Adamson dry fuel, a box of 12 patches, measuring cup, sandpaper and directions.

While serving its purpose as well as any of the large outfits for vulcanizing, it is much handier and efficient, as it can be packed away in the car among the tools or in any small space and is ready for use at an instant's notice. With such a device in the tool kit the motorist can cease worrying about possible punctures.

The Singleton-Hunting Co., Cleveland, O. Price, \$1; extra box of patches, 25c; extra can of dry fuel, 50c.



Adamson Vulcanizer.

Systematic Sales and Service Station System

Motor Parts Company Has Ideal Appointments and Equipment in New Boston Branch Headquarters



New Headquarters of Boston Branch of Motor Parts Co. at 104-06 Brookline Ave. Sales and Service Station for Bosch Products, Westinghouse Lighting and Starting Systems for Fords, Zenith Carburetors and Columbia Batteries.

THE opening of the new Boston headquarters of the Motor Parts Co. of Philadelphia with new and modern equipment in every respect is of interest to motor car owners, dealers, garage and supply men alike, as this company acts as distributors as well as service agents in New England for many of the best known and most widely used automobile equipment products.

Motor Parts service now practically covers the eastern seaboard, as in addition to the big new main headquarters station at Philadelphia, 847-49 North Broad street, Philadelphia, and this new station in Boston, there are also well stocked and fully equipped distributing and service stations at 1789 Broadway, New York City; 143 Chestnut street, Springfield, Mass., and at 1064-6 Main street, Buffalo, N. Y.

Efficient, reliable and prompt service was the trade slogan adopted by the Motor Parts Co. when it started in business and that this policy was strictly adhered to throughout its business dealings with the public, finds no stronger proof and substantiation than in the fact of the company's rapid growth and expansion throughout the eastern states.

The company started business in Philadelphia seven years ago and the headquarters, which is still maintained there, was recently moved into a new building at 847-9 North Broad street, with 25,000 feet of floor space. About a year after the company was founded a branch was established in Boston under the management of Fred W. Wilkening, who is now secretary-treasurer of the company. This branch was opened at 185-7 Columbus avenue with space on two floors and about 3000 square feet of floor space was occupied and five men comprised the entire force at that time. The force had to be increased from time to time and early in the past year it became evident that larger quarters were necessary. The three-story building with basement at 104-06 Brookline avenue was leased late in the year and the new headquarters occupied about the middle of January. The two upper floors were rented, the ground floor and basement, with approximately 10,000 square feet, or three times the room formerly occupied, being sufficient to house the company's activities for the present at least. The upper floors, however, have been let on terms that will enable the Motors Parts Co. to

occupy them when business requires it and the management feels confident that not many years will elapse before the entire building, or about 20,000 square feet, will be needed to meet the constantly expanding demands for more stock room, service space and repair department.

In front on the main floor there is a spacious business room, extending the full width of the building. A large receiving and business counter runs nearly the entire length just in front of the partitions, walling off the stock room and business offices, the latter occupying the major portions of the main floor in the centre at the left side, and the stock room occupying a similar space on the right side. The receiving and shipping room are conveniently located at the rear of the stock room and have an entrance opening directly onto the alley at the rear of the building, which arrangement makes it possible to drive the service car into the building where the parts and supplies are received and stocked or shipped.

A most efficient, yet simple, system of handling repair and service work has been developed by the company, which insures a proper record of the work, as well as proper workmanship, and through which the cause of any mistakes or errors due to improper instructions can readily be traced and rectified. If the instrument to be repaired or adjusted is received over the counter a check with a number is torn from the instruction card and given as a receipt. If the instrument is received by express a similar card is made out. This card while only five inches wide and 11 inches long carries all the information about the instrument or part from the time it arrives until it leaves the station and tallies all the work done on it, as well as showing reasons for repair, nature of repair and reasons for extra charges if they are necessary in case of service work. The accompanying cuts showing both sides of the card, with its complete and exhaustive detail for itemizing every record and the information concerning the instrument or part.

On the reverse side of the card is the shop report, which when filled out not only tells everything that has been done to an instrument or part, its condition when received and when completed, but also the nature of the work done on the job, time required and all material used. A glance at this card will show how readily the cost of a job can be arrived at and the completeness of the report that could be made if necessary as to every detail of the work.

The stock room is divided into sections, each devoted to one of the company's lines. The stocks carried on these lines is the largest of any in New England on the respective parts or equipment, and they are very complete. The most interesting of these stocks is that in the magneto department, which,

Electrical and Special Equipment for Motor Cars and Motor Boats

New Paige Cars Very Distinctive

Bodies and Chassis Have Many Exclusive Features—Enclosed Models are of Convertible Type

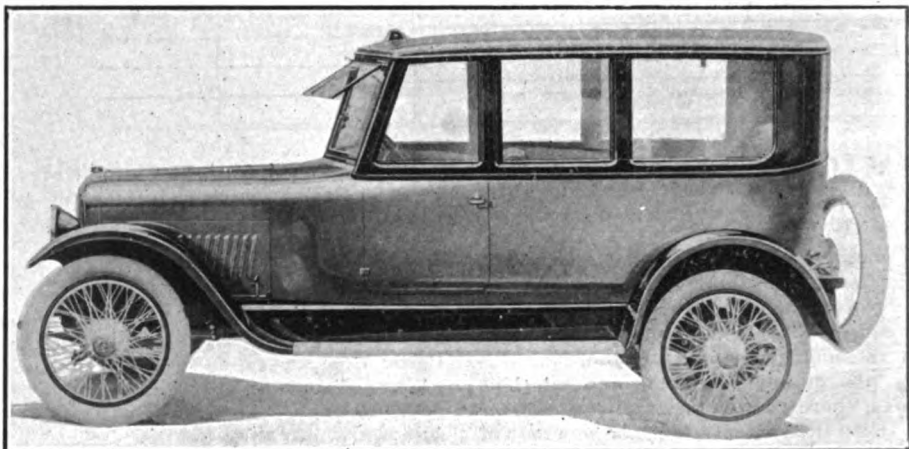
DISTINCTIVE individuality is the outstanding characteristic of the new line of Paige cars, both as to finish as well as mechanical detail. In design they might be called a daring combination of charm and beauty, combined with practical utility, all of which features are readily discernable, both as to appearance and in operation.

To the American woman, with her love of luxury and comfort, the interior designs will especially appeal, for they possess the same care of detail that is found in their homes. Rich tapestries, soft cloths, shimmering silks, laces, mahogany, plate glass, thick carpets and clean cut metal trimmings create an atmosphere of ease, comfort and luxury that appeals to the most fastidious.

Then, too, the gentleman motorist finds his comforts in the Paige. Cigar lighters and ash trays are easily at hand and light switches, speaking tube, pull-to-handles, window adjusters, robe rails and foot rests all combine to put him at his ease.

Both the sedan and the coupe models are of the convertible body type that provide an open car for summer and an enclosed car for winter or wet weather. In construction details nothing has been slighted. The roofs are made in a single piece and have no seams or joints. The base of three-ply bass wood with a cambric sheet glued over the entire top forms an assembly that is light, rigid and rattle and weather proof. A novel and desirable detail is the weather proof rail. The window must "jump" this rail

in canvas pockets. These are in turn assembled in a frame construction that make up the seat and back. This new type of cushioning conforms with the curves of the person seated and are much more comfortable than the old



The Paige Convertible Sedan Model Six "55" Showing Individual Body Lines and Top Design.

style. The springs are claimed to hold the cushions in shape much longer than the old style.

The Paige sedan seats seven passengers. The tonneau seat is the maximum width and amply large for three people. The auxiliary chairs fold up into the back of the front seats. In the driving compartment there is a full width seat that holds three people in comfort.

The model "55" coupe is a car that

dies. A large compartment is built into the rear deck where luggage for a tour can be stored away, the door being fitted with a Yale lock.

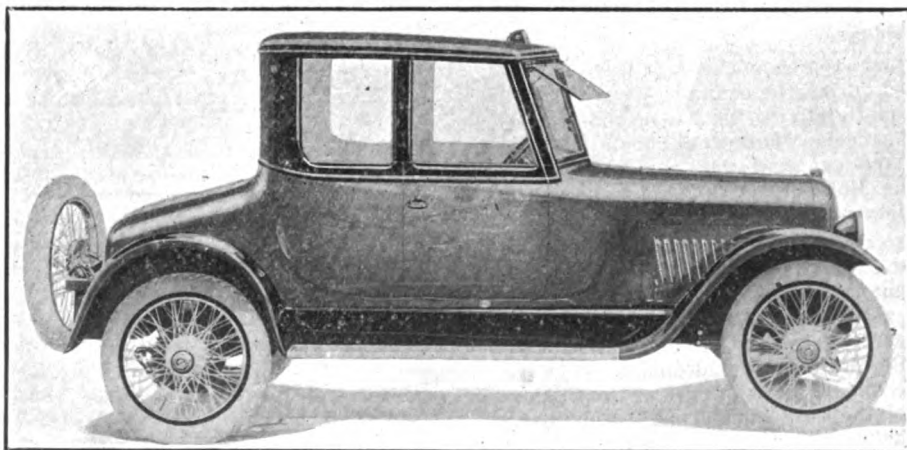
The Paige chassis, including the power plant, is a remarkable product, as it not only incorporates practically all the modern and tested improvements, appliances and devices, but has as special features several exclusive devices that place it well in the foreground of modern engine design.

The model six "55" engine has a bore of 3½ inches and a stroke of 5¼, with a rated horsepower at 29.39. The model

six "39" engine is similar in general detail, but smaller, having a bore of 3¼ inches and a stroke of five inches, with a rated horsepower of 23.44. The engine is a light, high speed type, very neat in appearance and easily accessible in case of repair. The cylinders are cast in a single unit and are integral with the upper part of the crank case. Removal of the head allows a thorough inspection or adjustment of the cylinders, water jackets, valves and pistons. Three bearings hold the shaft securely. The camshaft is also enclosed in three bearings while the engine is mounted on a three-point suspension.

A new and very valuable device installed upon the late Paige cars is the electric gasoline heater. It consists of an electrical heater that is placed in the bowl of the carburetor and controlled by a switch. Turning the switch sends an electric current into the coil set inside the carburetor, warming the raw gasoline so that it readily vaporizes in winter, as well as in summer, insuring easy starting. Tests by the Paige engineering department show that this heater requires about 32 amperes for 30 seconds, while the starting motor in cold weather with an equal amount of churning requires 90 amperes, so the advantage of this device is apparent.

Another attachment and one of merit is the Paige automatic valve cleaning and polishing device. It is designed to eliminate the warping, pitting and re-grinding of poppet valves used in internal combustion engines. Consisting of an adjustable spacer it can be locked after adjusting and in position under the



Paige Model "55" Coupe, Showing Full Side View, Wide Door, Low Body Lines and Graceful Back.

and settle into position outside of it. The action is automatic and caused by the turning of a handle, making the joint absolutely water tight.

In the place of the old coil upholstery springs, the Paige company have adopted the Paige-Marshall springs, which are small in size and are separately enclosed

instantly attracts the eye. Coupled with its excellence of appearance is the sense of speed and power it suggests, combined with comfort. The coupe will seat four passengers comfortably. The driver's seat is set more forward than the one opposite and behind this seat is a compartment for carrying bags or bun-

valve stem allows the valve to "float" and turn free under the action of the valve springs as they are compressed and released.

Still another improvement is the Paige new locking device. It is integral with the transmission cover and serves to lock the gear shift lever solidly into neutral position, it being impossible to change gears or even move the shift lever when the lock is closed. The lock itself is a steel hardened tube, hardened to resist tampering with and controlled by a Yale lock built into the transmission cover. The tube slides into engagement with the shift lever upon application of a push of the foot. This original feature is one of vast value to the owner for only by taking up the floor boards and unbolting the transmission cover and lifting the whole assembly out can the car be driven away, unless unlocked.

Though the Paige transmission gears have given excellent service in the past, a new quality steel has been introduced into them. It is $3\frac{1}{2}$ per cent. nickel, carbonized and hardened with a surface that is file hard, while the interior is softer, but of extreme toughness. In the main drive gear and countershaft the number of teeth, 28 to 14, have been changed to a new combination of 27 to 14, with the result that each complete turn of the gears a new tooth is brought into mesh with another tooth on the countershaft. In this new way a chip in a gear tooth would mesh with a different tooth, wearing down the imperfection until it disappears. The gear engagements are made with absolute silence and ease.

In the rear end of the transmission case is enclosed two spiral gears that drive the speedometer. This improvement makes sure of constant lubrication, quiet operation and freedom from mud and grit upon the speedometer gears.

In the distributor the breaker point metal has been changed to tungsten, which makes them practically indestructible. The dash is clean appearing and the switches more compact and simple for the convenience of the driver. Only one cable assemble is used, thus saving wire and making repairs extremely simple.

The new crowned fenders sweep in one unbroken line in accord with the rest of the body design and they give more protection from splashing mud and water. The curved aprons on the front fenders are rigid and rattle proof.

Many additional mechanical improvements have been incorporated in the new models, which cannot be enumerated for lack of space.

In addition to the sedan and coupe on the "55" chassis there is also the "Essex" seven-passenger touring car, seven-passenger limousine and seven-passenger town car. There are also four different body styles on the model "39" chassis, the "Linwood" five passenger touring car, "Dartmoor" three-passenger roadster, "Glendale" four-passenger chummy roadster and five-passenger sedan.

A winter top is made for all the open models, which costs \$198.50 extra.

Tests Anti-Freezing Solutions

Government Bureau of Standards Department of Commerce Gives Analysis of Various Formulas

The subject of anti-freezing solutions for automobile radiators has been brought very forcibly to the attention of users of motor vehicles this winter, and many requests for information regarding their use have been received by the Bureau of Standards, Department of Commerce. An investigation was undertaken by the bureau to establish the value of these compounds and sufficient data have recently been obtained to justify a preliminary statement. This work will be continued, tests equivalent to service conditions will be made, and a more comprehensive report given at a later date, but in time for use during the coming winter.

A careful study of this question by the bureau leads to the conclusions based on experiment that, (1) calcium chloride compounds should be used with caution, if at all, on account of their corrosive action; (2) kerosene or similar oils should not be used on account of their inflammability, high boiling point and effect on rubber; (3) mixtures of glycerine and alcohol can be used, but the price of glycerine and the need for it in the manufacture of munitions at the present time should preclude its use; (4) solutions made from either wood alcohol or denatured alcohol seem at the present time to be the most desirable anti-freezing solutions to use. If the wood alcohol is free from acid there is little choice between the two alcohols. Wood alcohol costs more than denatured alcohol and is more volatile, but its lower freezing point allows a less amount to be used, which may counteract the above disadvantage.

The ideal anti-freezing compound is one that will prevent freezing of the radiator liquid without injuring either engine or radiator, that will not lose its non-freezing properties after continued use, and that does not materially change the boiling point of water when dissolved in it.

There are two general types of these compounds—one a solution in water of alcohol or glycerine, or of a mixture of the latter two, the other a solution in water of calcium chloride or the dry salt itself, which contains sometimes small amounts of other substances such as salt, sal ammoniac, sugar or syrup. Kerosene and similar oils, with admixture, are sometimes used.

Kerosene has a lower freezing point and higher boiling point than water, but the inflammability of its vapor makes it dangerous to use, and its high and uncertain boiling point might lead to the serious overheating of the engine, or even to the remelting of the solder in the radiator. It has a marked solvent action on rubber parts. These facts would seem to clearly indicate that this material should not be used.

The alcohol-water type is the most common and is not generally sold under any trade name, but recently there have appeared on the market a number of anti-freezing compounds of the calcium chloride type. These compounds are sold under a variety of names and startling claims are made for their effectiveness and lack of injurious effects.

The alcohol solutions do not exert a greater corrosive action than water alone. This can be predicted from theoretical considerations and is well established in practise. However, wood alcohol sometimes contains free acid, such as acetic acid, which is objectionable, and for this reason wood alcohol should be used only when it is known to be free from acids.

The calcium chloride compounds exert a greater corrosive action than water on the engine jacket, on the solder in the radiator and on aluminum, which is sometimes used in manifolds, pumps and headers. The effect on engine jackets may be neglected since these are generally sufficiently heavy to permit considerable corrosion without being weakened. The effect on soldered joints may be serious, since tests made at the Bureau of Standards have shown the complete removal of solder from copper and brass when immersed in a hot 20 per cent. calcium chloride solution for four days. A number of such tests were made and there was always a more rapid corrosion or eating away of solder in these anti-freezing compounds than in water.

Another troublesome effect of calcium chloride solutions is experienced if small leaks occur in the radiator, the water jackets or connections, and the solution comes in contact with the spark plugs and ignition wires. In some cases the drops of the solution may be carried back on the engine in a more or less atomized state, assisted by the fan when running. The salt deposited when the water evaporates is very difficult to remove and when it cools absorbs water and becomes a good electrical conductor, short circuiting the spark plugs and sometimes making it impossible to start the engine. The difficulty may disappear when the engine is heated up.

There are also certain conditions in the manufacture of calcium chloride which may result in a compound that will deposit large crystals in the radiator as the solution cools; this may prevent effective circulation.

Regardless of these objections, reports have been received to the effect that calcium chloride solutions have been used a number of years in the same radiator without producing apparent corrosion. Nevertheless, such solutions cannot be recommended as safe, and they should not be used if there is any aluminum in the cooling system.

The chief advantage of calcium chloride compounds is that they are not volatile. The solutions can be kept practically uniform by adding water from time to time. Unfortunately this is not true with the alcohol solutions, because the alcohol continually boils out and it must be replaced frequently in order to maintain the proper proportion of alcohol. Glycerine is frequently substituted for part of the alcohol to reduce evaporation, but when glycerine is used the rubber connections may be affected somewhat seriously, depending on the quality of the rubber. The most practical method to maintain the proper quantity of alcohol in the solution is to determine the specific gravity of the liquid by means of a hydrometer and by reference to a table add the necessary quantity of alcohol to obtain the desired gravity.

This table and a statement regarding the use of a hydrometer can be obtained by application to the director, Bureau of Standards, Washington, D. C.

The price of these compounds is of decided interest. The retail price of de-natured alcohol is more or less definitely fixed by its cost of production and the prevailing market conditions. Calcium chloride is a by-product from certain manufacturing industries and is sold at less than two cents per pound, wholesale. However, when properly packed and labeled it is sold to automobile users as an anti-freezing compound at the rate of 25 to 50 cents per pound, an increase of between 1000 and 2000 per cent.

Without approving the use of a calcium chloride solution as an anti-freezing solution it may be said that a home made solution of calcium chloride can be prepared at a cost less than one-half the retail price at which such anti-freezing compounds are sold, by buying calcium chloride in the open market and dissolving it in water.

THE GREENLEAF CO. OCCUPIES NEW QUARTERS.

The Greenleaf Co., advertising and merchandising counsel, Boston, Mass., have sent out announcement in commemoration of their third anniversary, which was observed by the occupancy of an entire floor in the new Christian Endeavor building. This building, which is located at 41 Mt. Vernon street, is near the Massachusetts State House. A. E. Greenleaf, Henry Knott and G. R. Dunham extend a cordial invitation to visit them in their new offices.

PURITAN MACHINE BUYS YALE-8 MOTOR CAR CO.

Alfred O. Dunk, president of the Puritan Machine Co., Detroit, Mich., recently announced the purchase of the Yale-8 Motor Car Co. With this name added to the long list of orphan cars for which parts are supplied by the Puritan Machine Co., the total is over 200. From time to time the Puritan has purchased the entire service stock, blue prints, drawings, dies, jigs and tools of such

companies that are defunct or have discontinued their manufacture, and at present it is one of the most efficient and the largest establishments of its kind in the world. Parts can be supplied for any car regardless of year or model.

CREDITORS COMMITTEE OF GRAY & DAVIS DISCHARGED.

The creditors committee of the Gray & Davis, Inc., Boston, Mass., was discharged on March 23 after liquidating claims of over \$2,500,000 during the past 16 months. The company is now in excellent financial condition again and is doing a big business.

Rayfield Has Unique History

Many of the world's best known mechanical inventions have a romantic history. Some have attained early success, while others have remained in the stages of development over long periods before they gained a popular sale. No matter how valuable or how practical an idea may be it cannot be successful in a big way unless its presentation to the prospective buyer is backed up, first by distribution; second, by proper advertising, and thirdly, by merchandising knowledge.

An excellent example of this principle of business is found in the great success attained for the Rayfield carburetor through the efforts of E. A. Bates, sales and advertising manager of the Finkelston & Kropf Manufacturing Co., Chicago.

In 1910 Mr. Bates, while engaged in selling brass auto accessories for Finkelston & Kropf, made a business call on the Rayfield brothers, who operated a small machine shop in a basement on Michigan avenue. Charles Rayfield, one of the brothers had invented a new carburetor and while possessing great merit, not much of a demand had been created for it.

Mr. Bates foresaw the opportunity for this new device and was sure he had found something of vital importance to the automobile industry. He readily convinced his employers of the big things that could be accomplished in the marketing of this product and the company soon absorbed the small Rayfield shop.

Under Mr. Bates' guidance, great educational publicity and direct advertising campaigns were successfully conducted from coast to coast, and today the Rayfield carburetor enjoys the distinction of being nationally known as one of the best.

Mr. Bates' efforts and knowledge of advertising and selling were largely responsible for its huge success in the accessory field and for the splendid results accomplished with the carburetor he was appointed to his present position in which he directs the sales and advertising departments of his company.

WISCONSIN AUTO TOP WILL DOUBLE MANUFACTURING SPACE.

The maintenance of high quality standards in products has always brought its reward to manufacturers and with their integrity unquestioned they enjoy a steadily increasing demand from year to year for their products, which means constant expansion of their business and production capacity. This first principal of good business has always been adhered to by the Wisconsin Auto Top Co. of Racine, Wis., manufacturers of the well known and widely used Badger brand of seat covers for automobiles, and their products are enjoying a popularity that has called for further enlargement and expansion of the manufacturing facilities at the plant, and to meet the demand promptly a new factory is being built which will double the present floor space. It is a model of up-to-dateness and will be ready for occupancy this spring. Efficient system of arrangement of the various departments and the most modern type of equipment will enable the company to maintain its reputation for quality in manufacture and at the same time speed up deliveries.

The company has recently added tire covers and slip roof outfits to its line. The new members of the line are on a par in merit with their other products, as they represent the same acme of quality in material and workmanship.

GREENFIELD TAP AND DIE ISSUES SOUVENIR BOOKLET.

The Greenfield Tap and Die Corporation, Greenfield, Mass., issued a souvenir booklet on the occasion of the formal opening of their new office building and shipping room and recreation building on March 5. The occasion of this "House Warming," as it was called, was to give the people of Greenfield and their friends outside an opportunity to look over the new buildings. Both of these new buildings are described briefly in the booklet.

The erection of these two buildings marks the complete amalgamation of the various units and divisions of the Greenfield Tap and Die Corporation, with its various plants in different parts of Greenfield.

The reception itself was marked by a very large attendance from the people of Greenfield, about 5000 persons visiting the buildings during the afternoon and evening.

Mr. F. O. Wells, president, and Mr. F. H. Payne, vice president, assisted by other members of the board of directors, received, and members of the office force acted as ushers and guides to explain the various departments and show the many labor saving and modern improvements in office equipment. Mr. J. T. Seller, secretary of the company, was chairman of the general arrangements committee. The booklet was prepared under the direction of Mr. W. L. Robbins, advertising manager. Refreshments were served and an orchestra furnished music.

EDGAR H. BRUNELLE WILL MOVE INTO LARGER QUARTERS.

Edgar H. Brunelle, 359-361 Fulton street, Troy, N. Y., dealer in sporting goods, motorcycles, bicycles and safes, will occupy larger quarters next month at 78 Fourth street. The business was founded in 1896 and has constantly expanded. In the new quarters there will be storage space for 100 motorcycles, as well as repair department and large stock of accessories. Besides the line of new and used Indian motorcycles, Mr. Brunelle is enlarging his line of sporting goods. Prompt service, both as to repairs and supplies, has built up a big business for the firm among motorcycle tourists.

NEW SANFORD MOTOR TRUCK DISTRIBUTORS.

The Sanford Motor Truck Co., Syracuse, N. Y., have announced the appointment of the following new distributors for Sanford trucks: R. V. Jones, Postal building, Kansas City, Mo., Kansas City and Oklahoma; The Lawrence Motor Sales Corporation, 136 West 52nd street, New York City, City of New York; Foley Motor Car Co., Newark, N. J., State of New Jersey; L. S. Hall Rubber Co., 804 North Carlisle street, Philadelphia, Pa., Philadelphia; J. A. Morris, 100 Temple street, New Haven, Conn., State of Connecticut; Oswego County Auto Co., Oswego, N. Y., Oswego County, N. Y.; R. E. Lent, Ossining, N. Y., Westchester County, N. Y.; W. Cady Smith, 1210 State street, Schenectady, N. Y., Schenectady County, N. Y.

WINTHER TRUCK CO. HAS VERY PROSPEROUS YEAR.

The Winther Motor Truck Co., Winthrop Harbor, Ill., which was organized only a year ago, reports it has designed, tested out, completed and marketed six different models of Winther trucks chassis, and on the 19th of January a dividend of seven per cent. was paid on the preferred stock of the company.

Mr. Winther, who organized the company after his return from an eight months stay on the Mexican border as engineer for one of the well known truck builders, says the remarkable results obtained were only possible where the same fundamental principles of design could be applied to truck chassis of all sizes and capacity. Since the first Winther truck took the road there has been no essential change in design, selection of materials or construction.

MASON TIRE AND RUBBER CO. OPENS NEW OFFICE BUILDING.

The new general office building of the Mason Tire and Rubber Co., Kent, O., was opened recently and an entertainment was arranged by the Kent Board of Trade, as a dedication of the new structure. The Mason Tire and Rubber Co. were hosts to the Kent Board of Trade with its 300 members.

The new office building was decorated

with the colors of the company, orange and blue, the service flag decorating the north wall. In the lobby was hung the American flag and all about the building was bunting.

Members of the Board of Trade were taken through the factory so that the people of Kent could see a rubber factory in full operation. In the office building were displayed crude rubber and samples of the products of the plant. About the main office building were placed used tires, showing the very high mileage that has been attained by Mason tires.

President O. M. Mason made an address of welcome and expressed his appreciation of the courtesies which had been extended by the Board of Trade of Kent from the first day he had had dealings with them.

Make Your Business Safe for Success

This well worded slogan appears in an advertisement of a national advertiser.

It sets the machinery of thought in motion and cannot help but cause the business man to take stock of his methods and his business, since it is obvious that we are all in business not for mercenary reasons, or for the mere occupying of our time, or just for the glory of it, but distinctly, for profit and success.

Success is measured by the yard stick of application. If we attempt to adhere to obsolete or loose methods in our business systems, it results in adverse conditions, hence it behooves all who are truly sincere in their desire to succeed to take advantage of those propositions that offer opportunities whereby improvement is gained and protection assured.

The garage and accessory business is no longer a "happening," it has a very distinct and prominent place in the directory of business, and to its everlasting credit, well may it be said, is manned by men of energy and determination.

In leafing through the very interesting literature of the Egry Register Co. of Dayton, O., it reveals the definite answer to the question of "better business."

They show how an Egry Register System benefits a business by promoting efficiency, establishing confidence and creating protection.

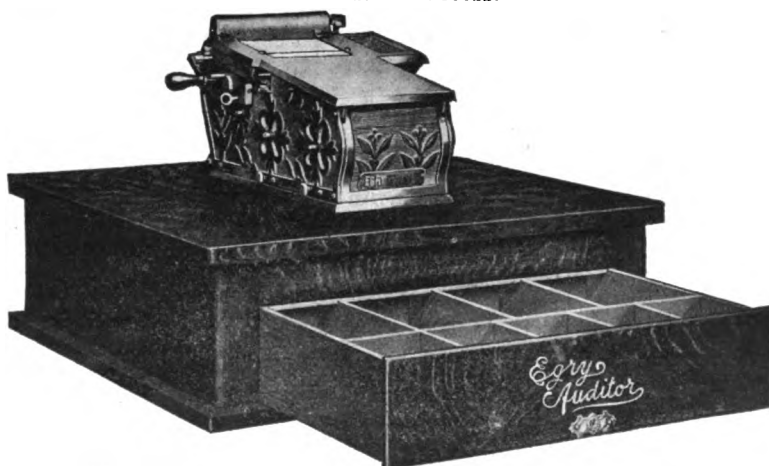
This is what the register system does for you and your business:

It produces an undeniable, positive, accurate record of each transaction, thus showing the day's business at a glance—just the information that the business man should have, to know what has been sold, at what price and by whom, how much money has been received from sales and from payments on account, what has been paid out, what has been sold on credit that he may know whether outstanding accounts are increasing or otherwise.

The customer becomes a part of the system since a sales check of every transaction, neatly printed, is given to the customer or wrapped with the purchase, an exact duplicate of that transaction has been issued for the benefit of the proprietor that he may know exactly what articles are leaving his store, whether the proper price has been secured or not. It tells who has paid on account just the same as it will for what purpose money has been paid out, and in addition to this there is that record which is the heart of the system.

With the Egry Auditor in use there is no such thing as staying long after hours in order to find balance. It compels clerks to be more accurate, prevents unpleasant disputes and unnecessary explanations, protects customers, establishing every reason to expect them to protect the merchant. The sales check makes this possible. It inspires confidence in the storekeeper, as the customer knows he will get all that he pays for—and good treatment. It links the customer, the sales persons, the merchandise and the receipts direct to the system. It keeps an accurate accounting of stock; it tells daily what is being removed from it, in other words, practically establishes a perpetual inventory.

Significant of the fact that the garage man is progressive, the Egry Auditor System has been and is being liberally adopted. You are solicited to learn more about the system and the Egry Register Co., Dayton, O., will gladly, without obligation, tell you a lot of interesting facts of how the Egry system will help "Make your business safe for success."



The Egry Auditor Used with the Egry Register System.

PLATE XIX.

INEXPENSIVE GARAGE FOR SUMMER PLACE

Plans Subject to Various Treatments to
Meet Building Conditions and Requirements

Designed by the Architectural Department of The Automobile Journal Publishing Co.

MANY motor car owners who have summer bungalows, where they spend several months of the year, will find in the accompanying plan a type of summer garage ideal for the purpose, as it is practical and inexpensive. The material entering its construction, wood, brick and cement, is obtainable at most any country general store, and the work required for its erection is of a nature that could be performed by the average man handy with tools.

It is not designed for winter use, but is so constructed that it could be readily heated with any of the various garage heaters on the market, and while simple in detail, should last through many years of service with the periodical application of a good coat of paint and minor repairs. Its dimensions, 18x12 feet, give ample room for housing one car with sufficient floor room to wash or make repairs inside the building. Foundation walls and concrete floor similar in type to those described previously in this series of articles should be installed where facilities make it convenient, as they will add to the life of the building, as well as its utility, although where the question of expense is to be considered and the material required for this work is not accessible, a shallow stone foundation wall would answer the purpose. The ground within the walls may be covered with cinders and tamped down, affording a hard enough surface to serve as a floor where the building is to be used only to house the car at night and provide a place for storing such supplies and equipment that would be kept on hand at a summer place.

The frame is built up on 4x4 inch sills of 2x4 inch studding; 4x4 inch plates; 2x6 inch rafters. The frame is walled in with North Carolina pine boarding, seven-eighths of an inch thick, with a covering of cedar clapboards laid four inches to the weather. North Carolina pine roofer with six-ply roofing paper makes a cheap and durable roof. Two large swinging doors in an entrance eight feet wide are provided for with two-pane sashes in the upper panels to give light additional to that provided by double windows on both sides of the building and in the rear. The use of good hardware on the doors and windows not only makes the first cost the last cost in this re-

spect, but keeps the doors in proper position and securely fastened. The Stanley garage door set No. 1776 is well adapted for this type of door, as while inexpensive, it provides all the necessary hinges, catches and fittings. This set, which can be purchased at most any hardware store, includes three pair of 10-inch reversed pad, extra heavy T hinges; one six-inch chain bolt with staples and six-inch foot bolt with floor plate and a thumb latch with door handle. If not obtainable at your store, a catalogue of the Stanley Garage Hardware can be secured from the makers, the Stanley Works, New Britain, Conn.

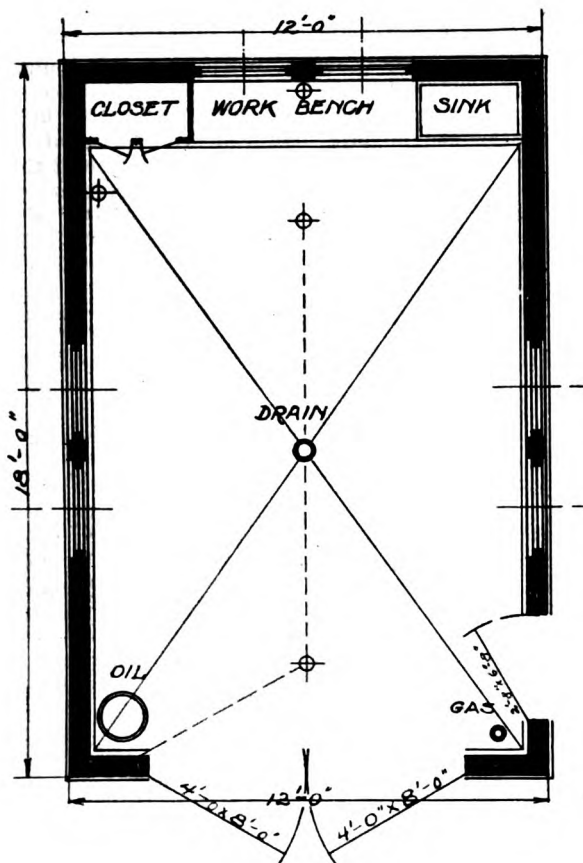
As shown in the accompanying elevation the front of the building can be carried up above the gable roof end, forming a pediment and giving the structure a little more character than if finished off like a common shed. In the section shown, semi-fireproofing construction is provided for by a single tier of bricks extending from the sills to the plates between the studding, which not only greatly increases the stability of the garage, but will make it retain the heat in winter. If in an exposed position the erection of this brick interior wall is advisable, as it will greatly increase the life of the building. Without it, however, the structure is practical for summer use and could be erected for about \$200, not including either the concrete floor or deep concrete foundation walls. With the latter incorporated and the brick walls, the cost would figure nearer \$300.

Ample space at the rear of the building makes possible the installation of a closet, work bench and sink, which equipment is even more necessary in a garage in the country, or at the seaside than in the city or suburbs, as there is usually a lack of facilities and seldom a public garage or supply station available to meet immediate requirements. The underground gas tank and pipe leading into the structure with pump is another installation which is very practical as well as economical, as, if gasoline is purchased in quantities it is not only cheaper, but the various companies have stations so well scattered about the country sections that they will deliver 50 or 100 gallons at a distance of several miles from their main depots.

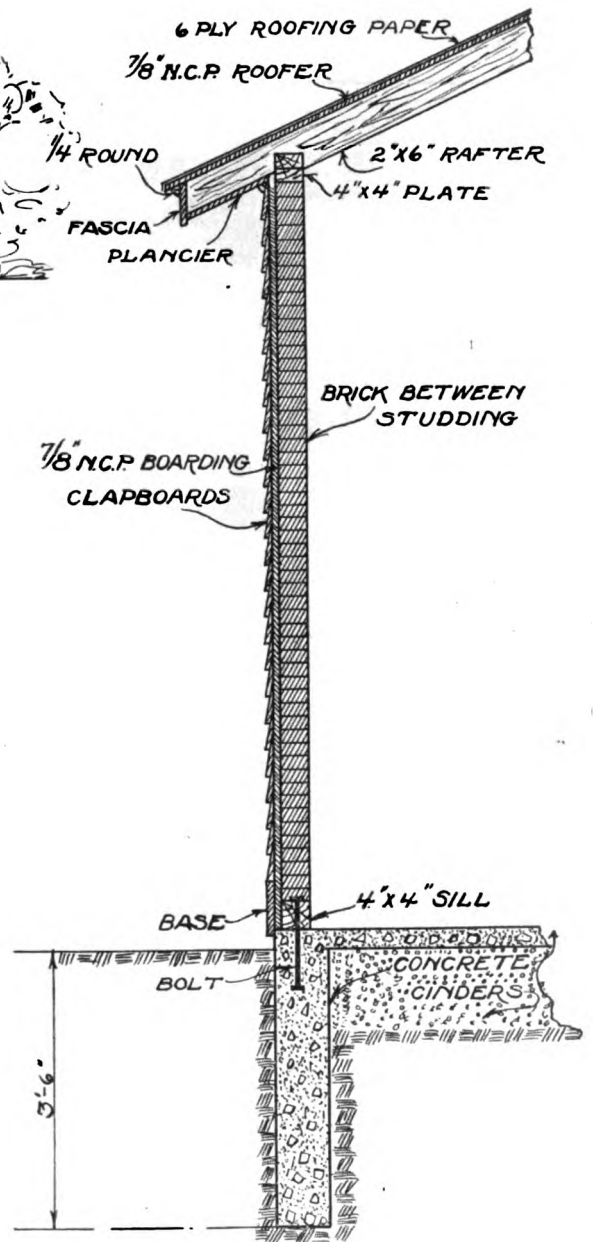
PLATE XIX



ELEVATION
SCALE



PLAN



SECTION
SCALE



Resiliometer For Making Various Measurements

New Instrument for Determining Exact Qualities of Different Kinds of Resilient Material.

The need of determining the exact qualities of any resilient material used for mechanical purposes has long been known to engineers, but this has never been practically possible until the invention of the Widney Resiliometer an instrument perfected by President Stanley W. Widney of the Widney Co. and the Advance Felt Specialty and Cutting

the degree of compression in thousandths of an inch, will measure the degree of expansion of a material when released from a given pressure and will measure thickness of material, in the same terms. In other words, the Widney Resiliometer will measure the thickness, hardness and resiliency of any resilient material quite as accurately as unyielding materials are measured by the standard micrometer gauges, and the indications are on a scale sufficiently large to determine these precisely. With this instrument all resilient materials can be standardized to any one or all three of the factors stated, and obviously these may be used for any mechanical purpose.

Universally Useful in Mechanics.

The instrument was perfected after four years' investigation, research and experiment by Mr. Widney, and it has been proven to be scientifically accurate.

The physical qualities of materials can be positively ascertained, which is a large progress when one understands that until now nothing could be known aside from "judging." Mr. Whitney conceived the instrument with a view of utilizing it in his felt business, but soon realized that the practical uses of it in industrial arts were well nigh universal—that it was not confined to the use he originally intended for it. Demonstration proved that it was almost indispensable in establishing absolute standards with reference to the physical qualities of resilient materials.

With the Resiliometer one can establish definite specifications on resilient mechanical parts. For the first time, with it, manufacturers will be able to ascertain definitely and positively the specifications best suited for particular needs in any mechanical work. It obviates guessing entirely in any determination. Once a standard has been fixed the manufacturer purchasing any materials for any purpose can order with the exact knowledge of specifications written from the instrument.

Consists of Four Elements.

It consists of the anvil, on which the material to be tested is laid; a direct reading micrometer calibrated to indicate thousandths of an inch, a quadrant actuated by a rack and pinion, which carries the supporting wire for the weight and registers through a plunger directly on the dial and the presser foot

that contacts with the material and registers on the dial. Simple as is the operation of the instrument, the development of it has been difficult. Its operation, because of this reason, has been reduced to the extreme of facility and simplicity, as no more skill is necessary to obtain readings than to read the time of a clock.

How the Records Are Found.

A piece of resilient material is placed between the anvil and the presser foot, and as soon as the presser foot rests securely upon the material the dial hand will indicate the thickness in thousandths of an inch. When this reading is obtained the weight running in a guide at the rear is released and allowed to apply pressure upon the material until it stops from the resistance to compression. The operator then has two readings, the measurements of thickness with and without compression of a standard weight.

Assume the initial measurement was 1/10 inch and the measurement under compression was .050. Then

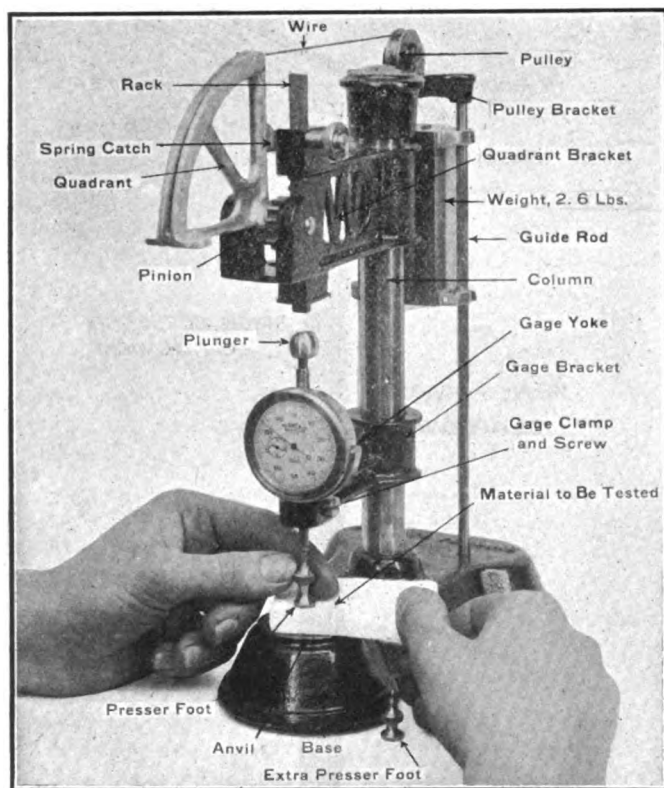
Original thickness.....100
Thickness under pressure.....050

gives the hardness of the material—its resistance to pressure—as 50/100 or 50 per cent. Were the original reading 72 and the reading under pressure 54, then the material would be 54/72, or 75 per cent. hard. A completely incompressible material would show a record of 100 per cent. hardness.

The Degree of Resiliency.

When the reading under pressure has been taken and the weight has been lifted as is provided for by lifting the quadrant of the instrument, the natural resiliency or expansion of the material when released from pressure will be indicated by the hand of the micrometer, which will turn backward. The degree of recovery in thousandths of inches is noted. Assume that the material which registered 50/1000 inch thickness under compression expanded so the indication was .080 when the weight was removed. The recovery amounts to .030, which is 3/5 of 50, or the thickness under pressure, which gives a percentage of resiliency of 60 per cent.

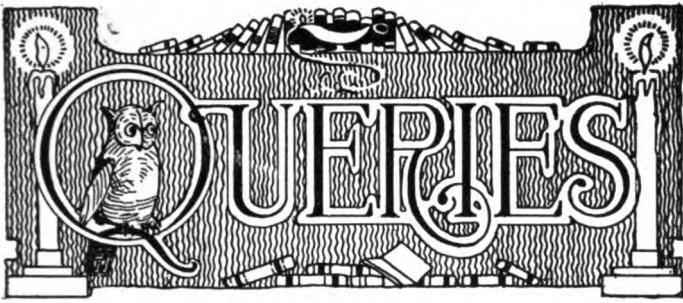
As the Resiliometer dial indicates in thousandths of an inch, obviously the number of possible combination specifications, showing thickness, hardness and resiliency, is very large, and with these practically any conceivable combination of qualities can be specified. The utility of the Resiliometer in any engineering department is evident. With it exact qualities can be determined and these can be obtained with reference to practically any material that is in use. With this instrument truck manufacturers can standardize the felt parts, or any other parts for which resilient material is required which is a factor of special importance, when the demands of the government upon truck manufacturers necessitates obtaining absolute accuracy or standardization of the physical properties of materials.



The Resiliometer, for Measuring Thickness, Hardness and Resiliency of Materials, Showing the Manner of Obtaining Exact Specification Data.

Co. of Chicago. In contrast with this fact statement may be made that the elasticity and hardness of metals has been practically obtainable by measuring instruments, and a device has been used for a considerable period to determine the resiliency of rubber tires for vehicles. But the accurate measurement of the thickness, hardness and resiliency of numerous materials used in mechanical arts, such as felt, fabrics, rubberized fabric, asbestos, leather, paper, packings of all kinds, fabrikoids, cork or anything that is compressible and has some degree of elasticity when released from compression could not be even approximately obtained.

The engineer and the expert mechanic will understand the possibilities of the uses of an instrument that will measure



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

WHAT ARE THE MOST IMPORTANT POINTS IN THE MECHANISM OF THE CAR TO BE GIVEN ATTENTION IN TUNING UP FOR THE SPRING DRIVE?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 20th of April. The contest is open to every one.

CARING FOR AND REPAIRING TOP AND UPHOLSTERY OF THE CAR.

(C. S. Barningham, Providence, R. I.)
(Best Letter.)

Mohair tops should be frequently dusted and brushed off. Fantasote tops and curtains are best cleaned with a soft brush dipped in water to which a little ammonia has been added. Afterwards rub dry. Never attempt to clean top and curtains with gasoline or kerosene.

Do not fold the top until it has become thoroughly dry, for any moisture remaining in the folds is apt to cause mildew, besides making the top leaky and unsightly with spots.

If a car is not used for some time it is best to open the top, thus keeping it well stretched and smooth.

Do not use gasoline in cleaning leather upholstery. Plain water with a little ammonia will remove the dirt and a brisk rubbing with a clean woolen or flannel cloth will do the rest. For still more careful treatment use a regular leather dressing. In cleaning cloth upholstery do not use an acid solution. Cloth is not affected by climatic conditions and will withstand both heat and cold, and not having oil in its make up does not pick up or hold dust readily. In removing ordinary dust, beat cushions and backs lightly with a stick or carpet beater, then remove dust with whisk broom or brush.

Grease or oil may be removed by the application of a solution of luke warm water and ivory soap applied with a woolen cloth. Any of the approved methods for cleaning woolen cloth may be used with success on this upholstery.

Gasoline and benzine have a tendency to spread instead of remove the dirt. The writer, therefore, does not recommend their use, although they work no injury to the fabric.

For making quick and permanent repairs of holes and torn sections in mohair tops, the writer uses a self-curing

(When Writing to Advertisers, Please Mention The Automobile Journal.)



The Prevention of Ignition Failure

can be assured by selling a Bosch Magneto for that car which lacks pep and punch in its get-aways, or that lays down whenever you step hard on the throttle.

Investigate Bosch attachments for cars that have chronic ignition trouble—Bosch is the cure.

Write for "More Efficiency"

BOSCH MAGNETO COMPANY

MAIN OFFICES: 204 W. 46TH STREET, NEW YORK
BRANCHES: CHICAGO DETROIT SAN FRANCISCO

Works and Foundries: Springfield, Mass.

MORE THAN 3,000,000 BOSCH MAGNETOS IN USE

ZENITH CARBURETOR

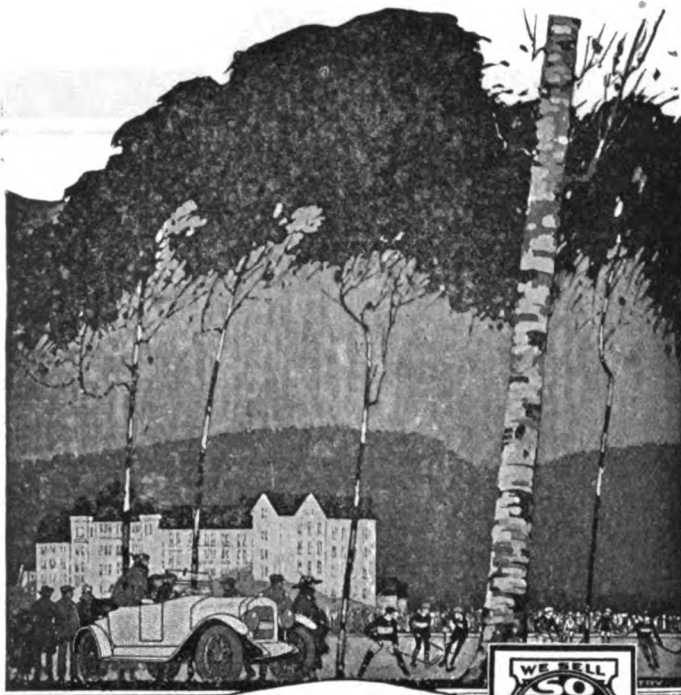
KNOWN the world over as the zenith of carburetor efficiency. A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.
New York Detroit, U.S.A. Chicago

NEW DEPARTURE BALL BEARINGS

Strength
Stamina
Service

The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensee



No Day Too Cold for POLARINE

The Standard Oil for All Motors

Polarine Oil gives mid-summer lubrication in mid-winter weather—maintains the same efficient film of oil between cylinder wall and piston. Heightens compression—lowers engine heat. Always high-grade—dependable.

And for quick starts, snappy pick-ups, no matter what the season, use SOCONY Gasoline. Pure, uniform, reliable.

Look for the Red, White and Blue SOCONY Sign.

STANDARD OIL CO of NEW YORK

(Principal Offices)

NEW YORK
BUFFALO

ALBANY
BOSTON

POLARINE



patch, which is sold in various shapes for 50 cents a box. These patches are a fine quality of mohair with a coating of uncurling gum on the under side. To use, simply remove the muslin from the gum side of patch and moisten with gasoline, cover the hole or tear with the patch and press firmly until the gum sets. This makes a neat and almost unnoticeable repair.

KEEPING TOP AND UPHOLSTERY NEAT.

(Ronald L. Prindle, N. Abington, Mass.)

(Second Best Letter.)

Intelligent care given to both the top and upholstery of the automobile pays large dividends, in the form of protection from snow in winter and sun and rain in summer.

A weekly brushing of the top both inside and out will add greatly to its life. A fabric top never should be cleaned with any solvents such as benzine, gasoline or kerosene, for these attack the rubber in the top, causing the layer to separate, which means rapid depreciation and leakage. Good castile soap and water should be the cleaning medium and a stiff brush to rub it in. After using soap in this way the spots should be rinsed in clean water and wiped dry with a piece of chamois. If care is not taken to use pure soap it may result in portions becoming spotted. A mohair top is very expensive today and needs careful consideration. If the car is laid up for any length of time it is much better to leave the top up.

In case of tears repairs to the side and rear curtains should be made with a patch stitched from the inside to a patch on the outside, and held in place with waterproof glue or cement and rubbed firmly with handle of a screw driver.

Upholstery certainly looks better when it is clean and for this reason should be cleaned once a week in dusty weather and may go for longer periods in the clean atmosphere such as winter affords. This does not mean merely wiping the surface of the seat cushions, but includes wiping under the piping and into the corners where lint and dust naturally accumulates after the dust has been removed by the use of a vacuum cleaner (hand operated or otherwise). On some cars provision is made for cleaning upholstery by attaching a hose to the engine. Leather upholstery may be cleaned by wiping with a soft woolen cloth (the use of cotton or flannel sheds lint and is undesirable), saturated with a weak solution of ammonia.

Castile soap is equally effective in the cleaning of leather, but gasoline or similar liquids are injurious, because they cause cracking. A solution safe to use occasionally upon leather is linseed oil thinned with a little vinegar. This is applied with a cloth and allowed to remain for a few hours and then wiped off. Where imitation leather is concerned, ivory soap and water are recommended for the removal of spots, and linseed or sweet oil in small amounts help brighten up the finish. Nothing detracts from the looks of a car as does torn upholstery with the hair filling showing through the break. To make a lasting repair the upholstery will have to be lifted by removing the fastenings or nails or binding until sufficient space is made to permit the insertion of a large piece of heavy canvas or other suitable material. Care should be taken to get the canvas several times larger than the break to be repaired. With fine carpet thread sew all around the patch with fine stitches and when completely fastened go over the patch and leather with some good leather renewer purchasable at any automobile supply house. If, however, the upholstery is badly torn, new imitation leather can be used for covering and the average person can make a satisfactory repair by the use of the French plaiting method.

When detachable upholstery covers become greatly soiled they can be removed and sent to a cleaning establishment. Small spots can be taken out with a brush dipped in gasoline, soap or water. Care of both the top and upholstery is time well spent and aids greatly in making a resale.

CLEANING AND REPAIRING TOP AND UPHOLSTERY.

(R. S. A., Benton, Pa.)

Keeping top and upholstery of a car looking well all depends on the kind of material that it is made of and the kind of usage it is subjected to. For instance, if a top is mashed it will never present as good an appearance as one that has always been kept up.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

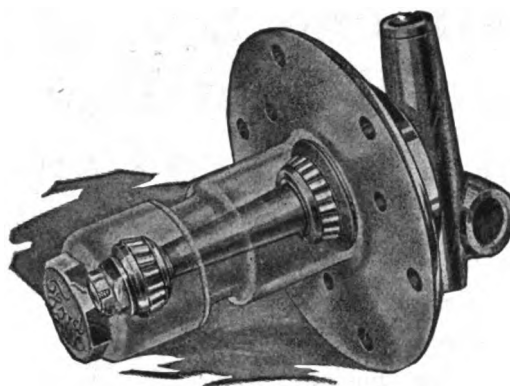
The chances are 4 to 1 that the bearings in your Ford front axle won't last 12 months. Why not anticipate the troubles bound to come through poor alignment and install Wright Taper Roller Bearings to prevent these troubles?

These unique roller bearings are identical in design with those used on the highest grade passenger and commercial vehicles. They'll outlast your Ford and will absolutely prevent misalignment of the front wheels and excessive tire wear. The use of demountable rims crushes the present Ford bearing. Wright Taper Roller bearings will carry this additional load. There's no difficulty in installing them as they fit the Ford without any changes whatever.

Price, \$10.00 per set

(4 Bearings)

In Canada, \$15.00



Wright Taper Roller Bearings Installed on Ford Front Spindle.

Dealers write Dept. M for proposition and details.

NATIONAL BEARINGS SERVICE CO. WRIGHT TAPER ROLLER BEARINGS

Replacements for all Standard types of Bearings

723 N. Broad Street

Philadelphia

My experience has been with tops made of mohair, which I believe to be as good as any. I never mash the top, as this makes wrinkles, which sooner or later will cause the top to leak. In case of a sudden storm there is nothing to do but snap on the side curtains and all is ready, many times saving the upholstery from a wetting and if the upholstery is covered with dust it will soil very much. (An ounce of prevention is worth a pound of cure.)

In case the top needs repairing, suitable material, the same as the top, can be obtained with cement patches of the required size and these can be attached with good results. When the car is to be washed, first remove all the dust from the upholstery. Begin washing at the top with the hose nozzle set to throw a spray. Use a small whisk broom, throwing water against same and with brushing lightly all the remaining dust and dirt will be loosened. Rinse thoroughly with water and allow the top to dry. When dry, if any spots remain, they can be removed with a cloth and gasoline. A small piece of sponge would be suitable also, as this leaves no lint. In regards to upholstery it may be treated very much the same as the top, providing it is leather or waterproof cloth. Most cars at the present time are fitted with one or the other. A sponge or cloth moistened with water is sufficient to clean same. Every day use has led me to believe that the waterproof cloth for upholstery far excels leather, for it is warmer in winter and cooler in summer. Also most leather upholstery will rub off on white clothing, the stain being almost impossible to remove.

USING A LARGER SIZE CARBURETOR.

(J. A. G., Woonsocket, R. I.)

Will you kindly advise me if it would be advisable to use a carburetor one inch in size where a six-eighths was formerly used and if this would be an advantage what would be the best way in doing this?

The size of the carburetor to be attached must be determined by the area of the valve opening on the engine, but not by the cylinder displacement, as the first is the true

(When Writing to Advertisers, Please Mention The Automobile Journal.)

measure of the engine's capacity. The carburetor cannot deliver more charge to the cylinder than the area of the valve opening will allow to pass.

Too large a carburetor would not only waste fuel, but also reduce the power of the engine by furnishing too weak a mixture. When the carburetor is too small for the engine it becomes cold in operation, as the amount of heat necessary to effect the vaporation of the gasoline is more than is available from the air entering or that could be secured through the carburetor by conduction. The temperature becomes so low that the water condenses on it and in some cases it results in the forming of frost on the outside of the metal. All this results from a carburetor too small for the engine.

The carburetor of proper size should have its passage equal to the valve opening of the engine. In multiple cylinder engines this area is equal to the valve opening multiplied by the number of suction strokes that take place simultaneously.

KEROSENE-GASOLINE-CAMPHOR MIXTURE.

(W. W., New Haven, Conn.)

Will you please publish in the Queries Column of the Automobile Journal if you think that a mixture of gasoline and kerosene in equal proportions with one ounce of gum camphor to every five gallons is feasible for warm weather running. What is the effect upon the engine or carburetor?

The mixture of gasoline and kerosene in equal part with one ounce of gum camphor is practical for five gallons of this mixture. This will not damage the engine or the carburetor, still it may increase the deposits of carbon in the cylinder due to the use of kerosene. Just how the engine will run on this mixture is hard to say and it will depend upon the carburetor to a great extent. The same applies to starting. You may find that it is best to install a two-way connection on the carburetor, connecting one way with the tank and the other to a small tank of gasoline, using the pure gasoline to start with. After the engine has been heated up this can be turned off and the regular tank opened.

Sell The Spring You Would Use On Your Own Car

Put yourself in the customer's place. — That will make more business for you, and eventually, for us.



THERE'S A HARVEY JOBBER NEAR YOU
Our new catalogue giving Complete measurements
of over 900 Styles of Springs is yours on request

HARVEY SPRING & FORGING CO.

915-17th Street

RACINE, WIS.

TROUBLE WITH OLDSMOBILE MODEL 43.

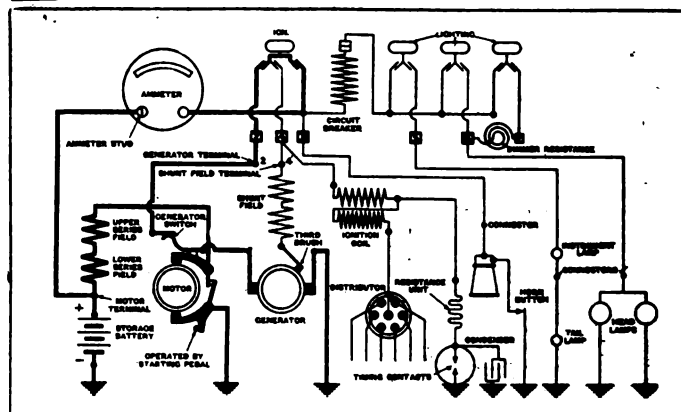
(W. S. L., Taunton, Mass.)

I have an Oldsmobile model 43 which is fitted with a Delco electric system. Will you kindly tell me where I can connect a spot light with the system? When I press down on the starting pedal, though the motor armature revolves with the switch pulled out, it stops as soon as the pedal gets way down. Can you tell me the reason for this?

Herewith you will find a wiring diagram which is practically the same as the one used on 43 Oldsmobile. The only difference being in the distributor. The distributor on the diagram has six terminals, while that of the model 43 Oldsmobile has only four.

To connect a spot light with this system, connect one terminal of the spot light with the terminal marked No. 3 on the diagram. The other terminal of the spot light should be grounded to the frame. Should you wish to place the spot light on one of the lighting circuits, rather than the horn circuit, connect one lead with terminal marked 5 or 6, tail or headlight circuits respectively, and the spot light will be controlled by the switchboard as well as by the switch in the light. The other terminal of the spot light should be grounded.

The system on this car is of the one-wire type, with return through the frame. Your trouble with the starting mechanism is undoubtedly due to the grounding of the circuit when the starting pedal is depressed. Examine the wires leading to the starting motor and after removing the two covers at the top of the motor-generator, examine the connec-



Wiring Diagram Applicable to Oldsmobile Model 43. This is the Same Wiring as Used on This Car, with the Exception of Distributor, Which Has but Four Terminals on Oldsmobile.

tions inside the motor. Be sure that the insulation is not scraped from any of the wires.

Should you not be able to locate this trouble upon examination, we would suggest that you take the machine to a repair man, for there may be a short circuit in the wiring, which will cause great damage to the storage battery.

GROWLING SOUND IN FORD.

(H. B., Jacksonville, Fla.)

My Ford makes a growling sound at 30 to 35 miles an hour. This does not occur steadily, but once for every revolution. My engine is in perfect condition, as recently the valves were ground and the carbon removed. Can you tell me the reason for this?

It is probable if grind occurs once for every revolution of the rear wheels that the trouble lies in the master gear in the rear axle, or perhaps in the thrust washers. One of the axle shafts may be bent and this would cause the growl. The teeth of the master gear may be worn or chipped. If a piece is chipped of one of the gear teeth it often would cause damage to the other teeth. Take the rear axle apart and determine by inspection just which part should be replaced or tightened. Look into the drive shaft bearings, the pinion and the universal joint.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

PARTS FOR TRUMBULL CAR.

(R. A. R., Santa Cruz, Manila, P. I.)

I enclose Postal Money Order No. 496,571 for my subscription for three years, beginning Jan. 1, 1918. On the other hand, I would be obliged to you if you would let me know where I could get renewal parts for my Trumbull car. I have been told that the Trumbull Car Co. is out of business, but I need parts that I cannot get anywhere here, such as a complete wheel, a cylinder head gasket (copper asbestos) and a clutch cone yoke. You can do me a great favor by instructing me where these various parts can be purchased. I enclose a stamped envelope.

We refer you to the following firms who can probably furnish the parts you need: The Trumbull Motor Car Co., 2218 Diamond street, Philadelphia, Pa.; Louis Bergdoll, Philadelphia, Pa.; Levene Motor Co., 2018 to 2020 Diamond street, Philadelphia, Pa.; Lyon Motors Parts Co., Philadelphia, Pa.; Midland Motor Co. 2218 Diamond street, Philadelphia, Pa.; Puritan Machine Co., Detroit, Mich.

The Puritan Machine Co. is the largest dealer in and manufacturer of parts for cars no longer made in the world and we believe that any of the above concerns will give your order immediate attention.

CAUSE OF FIRE IN A MOTOR CAR.

(J. D. R., New York City.)

I have seen several cars burn at different times and although I have never had this misfortune I would like you to explain the most probable cause of these accidents.

Fires which originate within the car itself are most always caused by back fires in the carburetor and by accidental sparks or arcs. Spilt gasoline or oil, which collects upon the car parts, help spread the fire, which attacks the wiring, upholstery and all combustible parts.

Back fires may be prevented by giving an access of gasoline when the engine is cold so that the mixture may not be lean enough to burn so slowly as to be capable of firing the entering charge. Set a fine wire gauge cone into the intake pipe at the carburetor flange, as this will help prevent fire from reaching the carburetor.

Prevent sparks by seeing that the terminals do not become loose or that short circuits do not occur from the wearing away of the wiring insulation. The modern cars are now well wired and short circuits seldom occur. Avoid spilling of gasoline, as it is usually the ignition of the gas that causes the fire. Keep your motor clean.

CYLINDER DOES NOT FIRE.

(R. M. G., Pittsfield, Mass.)

I have a 1914 model T Ford, which has been run nearly 30,000 miles.

This year I had the cylinders rebored and new pistons fitted, but I have trouble in starting the engine. I find that No. 1 cylinder does not fire very well, judging from the plug. I have changed all the wiring, plugs, cells and even put on a new timer and roller, but still the cylinder does not fire evenly. Could you suggest a cause through your Queries Column?

A defective plug, a "shorted" high-tension wire and perhaps a defective valve would prevent that cylinder from functioning properly. The cylinder may not be getting the same mixture as the others. Remove the exhaust and let the engine fire into the air. The flame from all cylinders should be the same color throughout and a rich mixture would not "bark" as snappy as a poor mixture. If there is an air leak in the cylinder it would become sooty or an air leak around the inlet valve would cause poor firing. When the engine is running slowly test for air leaks by injecting kerosene on all parts liable to leakage. Take off the cylinder head and clean all inside surfaces. Put on new gaskets and tighten all bolts uniformly. The oil level may be too high. This would cause misfiring.

Always have the oil just a little way over the upper petcock, as this will save the gumming up of the spark plugs and result in a cleaner engine at all times.

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It Hammer's Gears to pieces

Each gear tooth acts as a friction hammer banging away at the opposing teeth—when no lubricant cushion intervenes.

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TIMES BUILDING, PAWTUCKET, R. I.

WASHING A CAR.

(G. L., Ayer, Mass.)

I have a new car and at this season of the year the roads are always muddy. Can you instruct me in the proper way to wash and clean without deadening the gloss on the car, which means so much to its appearance.

The following suggestions, if carried out, may mean the saving of considerable expense to you: If city water is convenient the car should be thoroughly rinsed off with cold water by means of a hose. After the most of the dirt has been loosened and washed off by the stream the car should be gone over with a large, soft sponge and the use of a good automobile soap employed. It is absolutely necessary to use a good automobile soap, not common soap. There are so many excellent makes of body soap now upon the market that you should have no difficulty in purchasing a suitable one. The soap suds should then be washed off with the sponge, after which the car should be rubbed with a clean, soft chamois. Be sure that the chamois is free from particles of grit, as this would scratch the surface of the varnish.

ADJUSTING CARBURETOR ON PEERLESS.

(T. A. S., Menominee, Mich.)

Will you please give me instructions how to adjust carburetor on model 48-6 Peerless car. I am a subscriber of the Automobile Journal and I enjoy it very much, especially the mechanical portion. I have gained considerable information by reading it.

Only one adjustment is provided or found necessary on the Peerless carburetor, which is made by means of an adjusting nut that varies the tension on the auxiliary air valve spring. First, warm up the engine and turn the adjusting nut up or down until the engine idles slowly and evenly. It should not be necessary to turn this nut more than a few notches either way. The proper mixture for the various other speeds will be furnished automatically and this can only be changed by changing the size of the nozzle. There is a screen provided to prevent any foreign substances from entering the carburetor float chamber. If engine stops at any time this screen should be examined and cleaned.

ADJUSTING NEW BEARING IN FORD.

(H. J. A., Chicago, Ill.)

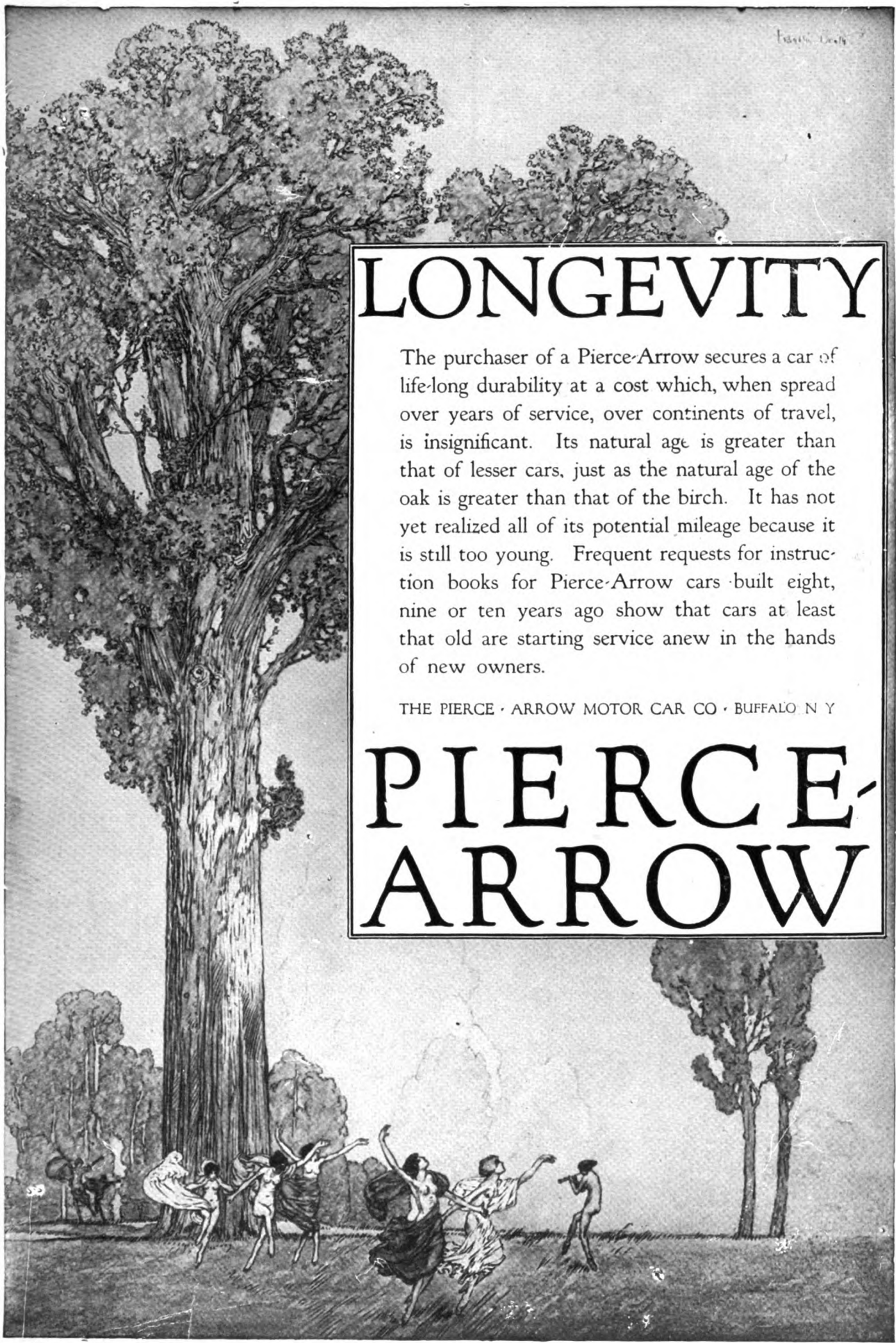
I would be much obliged if you would please enlighten me on the following question. I have asked a number of mechanics and they have all given me different answers, so I will leave the final answer to you. Is it necessary to remove the block and flywheel to put in a new connecting rod bearing in number four cylinder, or would it be possible to do it otherwise? It seems too much work to tear down the engine to put in one small bearing. As you probably know, Ford bearings do not need to be scraped in and I thought that by tightening up the connecting rod bearing it would do just as well. Is it possible to remove the block on a Ford without removing the flywheel?

We assume from your letter that you wish to remove the entire connecting rod assembly of number four cylinder. Proceed as follows: First disconnect the hose mountings to the radiator and the bolts holding the cylinder head to the block. Remove the cylinder head, taking care that you do not injure the gasket in doing so. Lay the head aside and drain oil from the crank case. Remove the cover from the bottom of the crank case. Bring number four cylinder about half way on the up stroke. Take out the cotter key and the nut from the right connecting rod bolt. Turn the crankshaft over until the connecting rod cap is almost half way down on the right hand side. Now pull the other cotter pin and nut from the bolt. The Walden-Worcester wrench number 5810 is especially made to fit this nut and will be invaluable for your purpose.

After this has been done the piston and connecting rod assembly can be pushed up through the block.

It is not possible to remove the block without removing the flywheel. The entire engine must first be swung from the frame before the flywheel can be removed from the block.

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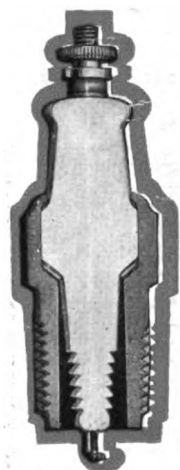


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PAWTUCKET, R. I., APRIL 10, 1918.

NO. 5



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Your customers will observe and appreciate the use of such modern, labor-saving tools. Every wrench at quick command and adapted to serve your every purpose. You can do a perfect job, speed up your work and increase your profits.

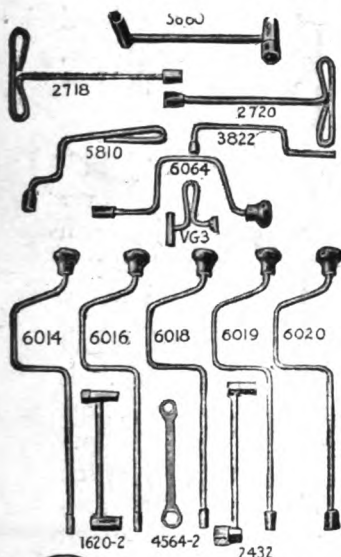
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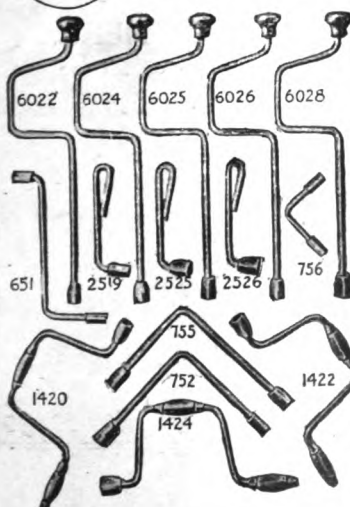
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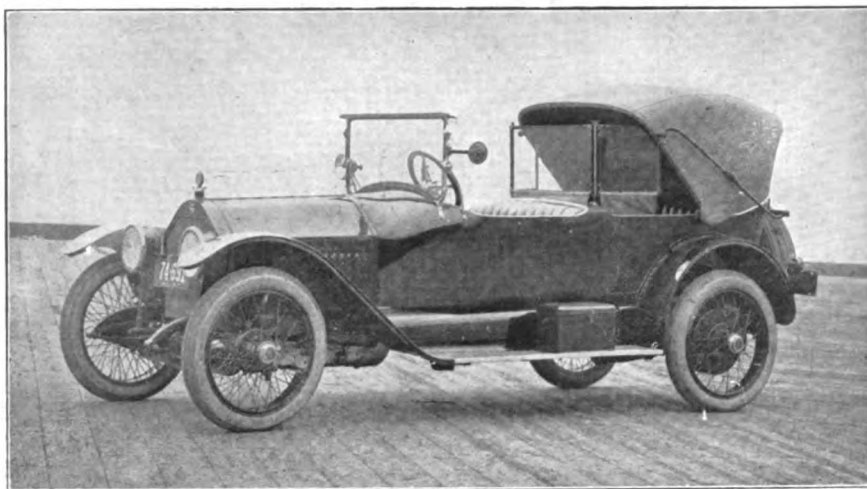
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YOU have a windshield to protect the driver
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31x4 .. 5.00 & up	37x4 1/2 .. 8.50 & up
32x4 .. 5.50 & up	35x5 .. 9.00 & up
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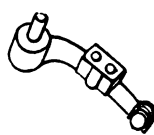
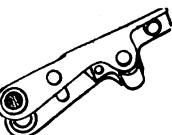
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Let Us Prove These Facts to You

Size	Tires	Size	Tires
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30x3	.. 3.00 up	35x4 1/2	.. 8.00 up
30x3 1/2	.. 3.75 up	36x4	.. 7.75 up
31x4	.. 5.00 up	36x4 1/2	.. 8.00 up
32x2 1/2	.. 5.00 up	37x4 1/2	.. 8.00 up
32x4	.. 6.50 up	35x5	.. 8.50 up
33x4	.. 6.50 up	36x5	.. 9.00 up
34x4	.. 6.50 up	37x5	.. 9.00 up

We carry at all times firsts and seconds of all well known makes, including, U. S., Fisk, Goodrich, Goodyear, Empire, etc. Special price on 37x5 tires. New Seconds.....\$23.00

Free delivery to all parts of New England if order is followed by check or money order.

Boston Auto Tire Exchange
204 Columbus Ave., Boston, Mass.

U S USED TIRES

Our references should command your attention. Any Boston tire agency, Dunn's and Exchange Trust Co. Mgrs. K. S. Brayton, George Vallely.

30x3	...\$3.30	34x4	...\$8.00
30x3 1/2	...\$4.50	34x4 1/2	...\$9.00
32x3 1/2	...\$4.85	35x4 1/2	...\$9.00
31x4	...\$6.00	36x4 1/2	...\$9.00
32x4	...\$6.00	35x5	...\$12.00
33x4	...\$7.00	37x5	...\$10.00

NON-SKIDS 10% HIGHER.

USED TIRE OUTLET CO.

191 Cambria St., Boston, Mass.

AUTO SALVAGE CO., INC.

The World's Largest New and Used Parts House. St. Louis, 2823-25 Locust St.; Kansas City, 1701 Main St.; Cincinnati, 214 E. Third St. Write to nearest office.

Parts for any Automobile at a saving of 50% to 80%. Our three great plants cover every state in the Union, and we are therefore in better position to fill your orders.

Engines—40 to 50 of them on the floor now and we will make prices on them that will move them. Several unit power plants.

Transmissions—Planetary, two-speed, three-speed, four-speed, centre control, with and without multiple disc clutch; all at surprisingly low prices.

Rear Axles—From the Timken to the Ford, many with transmission on them, at prices from \$10 to \$75.

Our Guarantee: You Must Be Satisfied. Any article purchased from us which does not in your opinion, give satisfaction or fit, can be returned to us at our expense and your money will be cheerfully refunded.

GREAT SLAUGHTER on Second Hand Auto and Truck Parts of all descriptions, including Magnetos, Carburetors, Starters, Head Lights, Radiators and everything pertaining to the automobile. Consult us first and save yourself time and trouble.

BOULEVARD MOTOR CO.,
276 River St., Cambridge, Mass.
Phone Cambridge, 1621.

AUTO PARTS.

50% to 75% Off Mfg. Price List. Parts for Packards, Buicks, Chalmers, Overlands, Jacksons, Fords and 75 others. You can save 50% to 75% from accessories. Mail orders will be attended promptly. Tel. Brockton, 910.

A. BERGER & SON,
104 Otis St., Brockton, Mass.

BOSCH MAGNETOS; all models; Elsemann, Splittorf and Remy Magnetos always on hand. Price list sent. D. G. Lenthe, Ordway Bldg., Newark, N. J.

TIRES at Wholesale

3500 miles guaranteed. We have the cheapest, highest grade, **LONGLIFE** and **RELIABLE** tire in the world.

PRICE LIST.

Size	Plain	Non-Skid
30x3	.....\$7.95	\$8.75
30x3 1/2	..... 10.30	11.50
32x3 1/2	..... 12.05	14.00
33x4	..... 16.85	19.00
34x4	..... 17.25	19.75
35x4 1/2	..... 24.25	27.00
37x5	..... 28.00	35.00

All other sizes on request. 20% deposit required on C. O. D. orders.

Mail your order now and save 25% to 50% on your tire bills.

M. LIBEN & CO.

205j W. 48th Street
New York City

We Carry the Largest Stock of

AUTO PARTS IN AMERICA

We furnish parts at a saving of

50 to 80%

Off Manufacturers' Price List.

If you're in a hurry just take your parts book of your car and deduct one-half of the price in there and write, wire or phone us the order. We will ship parts the same day your order is received. Special discounts to dealers.

GEARS

We have just received a shipment containing EIGHT TONS of GEARS for all standard makes of cars. Send us your old gears and let us match them.

Big Bargains in Motors, Parts, Accessories.

Every garage and repair man should have our new catalogue.

THE HOUSE RELIABLE.

THE AUTO PARTS CO.

4100 Olive St., St. Louis, Mo.

MAXWELL-METZ DEALERS.

We carry at all times a full and complete stock of Atwater Kent Parts. Also complete systems and magneto replacements. We are also manufacturer's agents for the

Walden-Worcester Wrenches.
Write for our Price List.

ATWATER KENT SALES CO. OF N. E.
883 Beylston St., Boston, Mass.

BOSCH

Splittorf, Elsemann

And all other makes of Magnetos repaired right.

Guaranteed Ignition Outfits
\$10. up

The Magneto Shop

JOHN BRUNSWICK.

187 Massachusetts Ave., Boston, Mass.

AUTO PARTS—At Your Own Prices. We can supply parts for nearly every make of car. 648 Packards, Interstate Fours, also Truck parts, GMC and other makes.

Write us for Parts. We have them.

STRANDWAY AUTO PARTS CO.,
193-195 E. St., South Boston, Mass.

TRADE OUTLET

DAVIS-LYNN STORAGE BATTERIES



Actual Photograph of Wooden Separator used only Three Months, or One Quarter of a Year.

Which Do You Want?

Batteries and Service

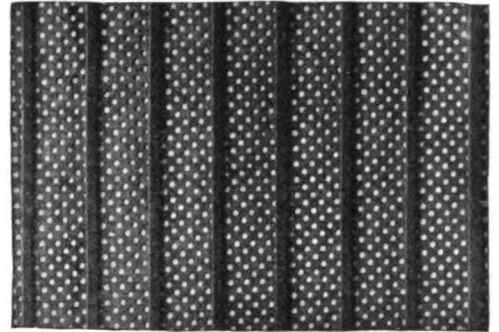
It makes no difference what kind of a battery you are now using we can take care of your

Repairs—Testing—Re-Charging

And when it comes to new batteries, see the Davis-Lynn to be convinced they are constructed along the right lines to insure long life without repairs or rebuilding.

J. R. JACKSON

247 Mass. Ave., Boston, Mass.
Tel. Back Bay 5182-M



Actual Photograph of Rubber Separator after being in Electrolytic Acid Seven Years.

TIRE DEALERS, ATTENTION!

Get In On the Big Demand For Good Seconds

The George Grow Automobile Co. is the largest dealer in quality seconds in New England. This speaks big, but it is big, and this organization will back every dealer to the limit—quick service, when you want it.

This is to be the biggest year on seconds in its history. Reports guarantee that, and the dealer who gets down to bed-rock and stocks up with a good tire is going to make money.

LET US SHOW YOU HOW TO GET IN ON THIS BIG DEMAND

We have a dealer proposition that has never been equaled, offering the fullest co-ordination between the largest tire house and you the dealer. If you will write us your wants we will be glad to go into our plan with you.

We Carry at All Times the Largest Stock of Tires in New England. Write Us Today

GEORGE GROW AUTOMOBILE CO.

321-323 Columbus Avenue, Boston, Mass.



*The List of Cars
and Equipment
Dealt With
Follows:*

Picking the Used Car
Ford, Model T
Chevrolet 4-90
Overland 79
Maxwell, 1916-17
Studebaker 4's and 6's
Dodge
Cadillac 1916-17-18
Hupmobile 1916-17-18
General Engine Overhaul
Packard Twin Six
Reo
General Chassis Overhaul
Oldsmobile, 44-45
Chalmers
Franklin Series 8
Saxon
Buick
Chandler
Paige-Detroit
Hudson Super-Six

Annual Overhaul Review

AUTOMOBILE JOURNAL

May 25th Issue

The most comprehensive presentation of information dealing with the overhaul and restoration of models of popular passenger cars ever compiled.

Every article complete, detailing with the mechanical attention necessary to make these machines thoroughly efficient and dependably serviceable.

All suggestions have been approved by practical men. A number of the greatest value to OWNERS of used cars, DEALERS and REPAIRERS.

This edition will be a wonderful medium for publicity for the manufacturers of parts and equipment included in or that may be utilized with the cars specified. The obvious reasons for specific advertising in this number cannot be too strongly emphasized.

It will be the opportunity of the year.

Reserve space by wire or letter. This will insure representation.

Last form closes May 5.

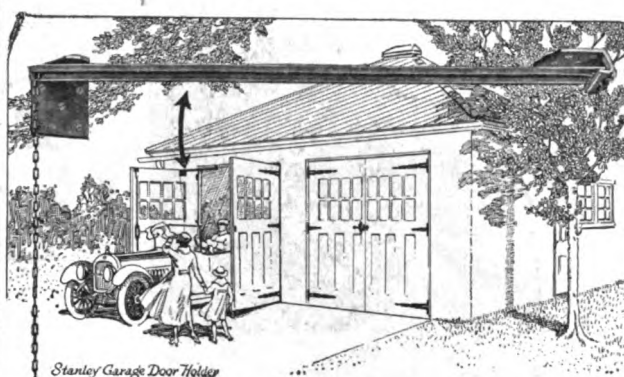
AUTOMOBILE JOURNAL

Times Building

Pawtucket, R. I.

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Don't Let Garage Doors Smash Your Auto.

Just as you are driving your car out the garage, a sudden wind may of slam the heavy door crashing against your car, smashing a lamp or bending a fender. Protect your machine by equipping each of your garage doors with a

Stanley Garage Door Holder

This is an arm of steel that automatically locks the door OPEN, insuring absolute safety for the car going in or out. A pull on the release chain permits the door to be closed.

The Stanley Garage Door Holder is a form of automobile insurance you can't afford to be without!

The doors in the picture are hung on Stanley Garage Hinges Nos. 1457; 24 inch at top and bottom, 10 inch at center. These hinges are fitted with ball bearing washers. They close the door easily, quietly and weathertight. The latch is Stanley Garage Latch No. 1264, the bolt, Stanley Garage Cremona Bolt, No. 1052. All these articles are illustrated and described in the Stanley Garage Hardware booklet.

Write for Stanley Garage Hardware Booklet.
Stanley Garage Hardware is sold by the leading hardware dealers everywhere.

The Stanley Works

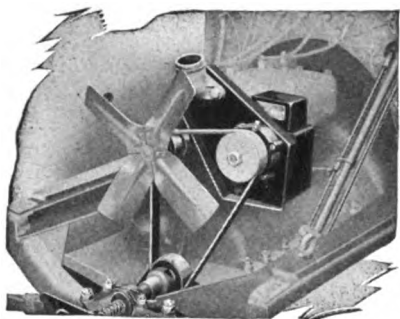
New Britain, Conn., U.S.A.

New York
100 Lafayette Street

Chicago
73 East Lake Street

Manufacturers of wrought bronze and wrought steel hinges and butts of all kinds, including Stanley ball bearing butts. Also Pulls, Brackets, Chest Handles, Peerless Storm Sash Hangers and Fasteners; Screen Window and Blind Trimmings; Furniture Hardware; Twinrold Box Strapping and Cold Rolled Strip Steel.

Stanley Garage Hardware is adaptable for factory and mill use.



FORD CARS

Electrically Lighted Like the Best

The Automobile Division Pettingell-Andrews Company offers the Ford owners of New England a most efficient electric lighting system at a moderate price in Genolite (a standard six-volt system).

The Genolite system lights a Ford through battery and generator giving constant and sure head and tail light while running or idle. It is easily installed—no machine work is involved. It is operated by a patented flat belt, positive and guaranteed generator drive with minimum wear. Lighting switch is conveniently located on the steering post, with two positions—full touring and dim.

Exclusive New England distributors for these proven products:

Eveready Storage Batteries
Eveready Ford Electric Starters
Genolite Ford 6-Volt Lighting System
Ford Speederators (make your Ford act like a six)
General Electric Tungar Rectifiers (battery charging outfit)
Exemplar Automobile Polish, etc.

Automobile Division

PETTINGELL - ANDREWS COMPANY

100 Brookline Avenue

Boston, Massachusetts

The AUTOMOBILE JOURNAL

VOL. LXV.

PAWTUCKET, R. I., APRIL 10, 1918.

NO. 5.

Good Demand For Used Automobiles At Chicago Exchanged Car Show

Sales About the Same as Last Year But The Aggregate Value
Was Larger, Totalling Approximately \$200,000
Prices Are Higher

THE second annual show of exchanged cars held in the Coliseum at Chicago under the auspices of the Chicago Automobile Trade Association, proved even more successful than the initial exhibition staged by the organization last year, and demonstrated that the sales and inspection methods employed in distributing used car meets with public approval.

There were 104 exhibits in the show, including 38 passenger car displays, 16 exhibits of trucks and about 50 accessory booths. The prices of the used cars displayed, the majority of which appeared almost as new, ranged from \$150 to

\$4000.

An admission fee of 25 cents was charged, although approximately 10,000,000 free tickets were distributed for the show. Over 800 cars were examined by the technical committee, of which number 725 were appraised as being in the proper mechanical condition to warrant their exhibition. Less than half of this number, of course, could be exhibited at the same time, so a rule was made permitting the exhibitors to remove cars that had been sold from their exhibits twice daily and replace them with others.

The total number of cars sold this

year at the show was about the same as last year, actual deliveries of about 220 machines being made, but the valuation of the gross sales was approximately \$200,000, as compared with about \$175,000 in 1917.

Practically all the prices established by actual sales indicated the upward trend in the used car market and had the weather been more seasonable or the show held later in the season an even stronger advancing tendency of prices would have been manifested according to the consensus of opinion among the dealers.

Prices Established on Actual Sales at Chicago

Ford 1916 roadster.....	\$275	Dodge touring 1916.....	650	Mitchell touring 1916.....	850
Overland roadster 83.....	400	Chevrolet touring 1917.....	650	Paige Fairfield touring.....	875
Maxwell roadster 1916.....	425	Dodge touring 1916.....	665	Oakland sedan 1917.....	875
King touring.....	425	Overland club roadster 1917.....	675	Hudson phaeton 1915.....	875
Overland touring 83.....	425	Oldsmobile touring 1916.....	675	Overland coupe 85-4.....	875
Overland touring.....	450	Hupmobile roadster N 16.....	700	Chalmers touring 6-30.....	900
Chevrolet touring 1917.....	450	Davis roadster F.....	700	Hudson cabriolet 6-40.....	900
Empire touring 1916.....	450	Hupmobile touring K.....	700	Elgin touring 1917.....	900
Overland touring 1916.....	475	Chalmers touring 32-B.....	725	Buick touring 1917.....	900
Grant roadster 1916.....	475	Studebaker touring 1917.....	750	Paige Fairfield touring.....	1000
Maxwell roadster 1916.....	475	Maxwell sedan 1917.....	750	Oakland 7-passenger 50.....	1000
Case 5-passenger 1915.....	500	Cadillac coupe.....	750	Mitchell touring C-7-42.....	1000
Dodge touring 1915.....	500	Patterson touring 1917.....	750	Hupmobile touring N.....	1000
Paige touring 1915.....	500	Reo touring R.....	750	Willys-Knight coupe 84.....	1050
Overland touring 4-83.....	500	Hudson phaeton 1914.....	750	Hudson touring 1917.....	1100
Locomobile touring 1912.....	500	Patterson touring 1916.....	750	Chandler touring 1917.....	1100
Briscoe touring.....	525	Mitchell touring 1916.....	750	Dodge sedan 1917.....	1190
Briscoe touring 1917.....	550	Cole 2-passenger 1916.....	750	Dodge coupe 1917.....	1190
Saxon touring 1916.....	550	Dodge touring.....	750	Elgin sedan 6-8-17.....	1250
Scripps-Booth roadster.....	550	Winton touring 1914.....	750	Haynes touring 37.....	1300
Cole touring 4-40.....	550	Dodge touring 1917.....	760	Kissel sedan 1917.....	1300
Overland touring 82.....	550	Reo touring 1916.....	775	Hudson sedan 1916.....	1350
Briscoe touring 1917.....	575	Paige touring.....	775	Hudson phaeton super six.....	1350
Studebaker touring 1915.....	575	Paige Fairfield touring.....	775	Cole touring 8-60.....	1350
Saxon touring 1916.....	575	Dort sedanette 1917.....	800	Franklin touring B.....	1450
Studebaker touring 1917.....	595	Haynes touring 35-T.....	800	Winton touring 21.....	1450
Studebaker E D touring.....	600	Grant touring.....	800	Jordan touring 1917.....	1500
Chalmers touring 1917.....	600	Oakland 34 touring.....	800	Cole 7-passenger 8-62.....	1500
Briscoe touring 1917.....	600	Reo touring 1917.....	800	Packard limousine 1914.....	1500
Chalmers 1916 touring.....	600	Chandler touring 1917.....	800	Detroit electric brougham.....	1550
Dodge touring 1916.....	600	Buick touring 1916.....	800	Ohio electric 1917.....	1750
Overland touring 85-4.....	600	Jeffery roadster 1917.....	800	Hudson super six sedan.....	1800
Studebaker 7-passenger.....	600	Studebaker touring 18-6-E.....	800	Hudson super six limousine.....	1900
Oakland touring 32-B.....	625	Pathfinder touring 7-B.....	800	Paige Fairfield.....	1900
Dodge touring 1916.....	645	Grant touring K.....	825	Hudson phaeton 1915.....	1950
Elgin roadster 6-16.....	650	Buick touring 1917.....	825	Winton touring 22-A.....	2250
Saxon roadster.....	650	Oakland touring 1917.....	850	Marmon speedster 1915.....	2300
Overland touring 86.....	650	Oldsmobile touring 1916.....	850		

Efficient Method of Handling Used Cars

The prices as shown in the accompanying table, taken as a whole, are a good criterion of the market value of the

Mechanical Inspection and Appraisal Committee

A. D. MORTIMER, Chairman

Please inspect the Following Car:
(Dealer fill out the following)

Make	Horse Power
Style	Color of Body
Model	Color of Wheels
Motor No.	Orig. List Price
No. of Cyl.	Low. Cash Price

CONDITION OF

Upholstery	Springs
Paint on Body	Brakes
Paint on Wheels	Radiator
Top	Magneto
Side Curtains	Starter
Motor	Battery
Transmission	Wiring
Steering Gear	R. F. Tire
Windshield	R. R. Tire
Unl. Joint	L. F. Tire
Front Axle	L. R. Tire
Rear Axle	

DEALER'S NAME

Address

Phone

By

MECHANICAL INSPECTION AND APPRAISAL COMMITTEE

Approved

Approved

Approved

Form 7 Chairman

Facsimile of White Card Which is Attached to Car by Dealer.

cars quoted, although they represent a different market than the open market, as in every case the car sold was practically rebuilt and in A-1 condition, while the majority of cars advertised for sale through the newspapers are offered "as is," which means that the seller makes no particular guarantee as to their condition, but will state all the known facts about the car.

When the initial show plans were made a year ago the greatest step forward which any body of dealers has made toward correcting an erroneous opinion of exchanged cars in the public mind was taken. This was the plan of inspecting and appraising every car allowed to enter the show and affixing a tag showing that the Chicago Automobile Trade Association guaranteed each car to be as represented. This plan gained the confidence of those who came to the show last year and was largely responsible for the success of the first efforts Chicago dealers made to bring exchanged cars together to compete for public favor.

In the process of this inspection and up to the time the car, if it passes inspection, is sold, three different tags are affixed to it. The first one, a white tag,

is filled in by the dealer and attached to the car before it leaves his place of business. This tag shows the make, style, model, motor number, number of cylinders, horsepower, color of body, color of wheels, the original list price and the lowest cash price for which it will be sold. In addition it shows the condition of all of the mechanical units, the lighting system, the tires, upholstery, paint, curtains and top. All of this information must be given, together with the name of the dealer offering it. When the car comes to the inspection field with this information attached, each item is checked over carefully and if the findings of the mechanical inspection and appraisal committee are the same as those shown on the card for each particular part covered, three members of committee affix their signatures to the tag. If any part does not, in the mind of the committee, come up to the dealer's statement, notation is made and the car sent back for further overhauling. Only

Auspices

Chicago Automobile Trade Association

Inspection No.

Price \$

Make Style

No. of Cylinders

Motor No.

Owner's Name

Inspected March 1918

We, the undersigned, certify that we have examined the above car as to the following:

Road Test

Mechanical Condition

Price \$

The Mechanical Inspection and Appraisal Committee

Chairman.

Form 8

Facsimile of Green Card Placed on Car When It is Exhibited.

two opportunities, however, are given for a car to come within the official O. K. of the inspection committee. If the lowest cash price which the dealer has placed on the car is not within reason the committee refuses to allow it to enter the show at that price and appraises the car itself, offering the dealer the privilege of showing it at that price or having the car ruled out of the show.

When the officially O. K'd cars come to the show the white tag is removed and the green tag showing the price of the car, the makes, style, number of cylinders, motor number, owner's name, condition shown by road test, and also the mechanical condition, is sealed to

the car in the same way that the doors of freight cars are sealed. A complete record is kept of the serial numbers of these green cards so that there is no chance for substitution and when a car is sold a sales ticket or a contract with a reasonable deposit must be shown which corresponds with the price listed on the green tag.

As soon as the car is sold a red tag is attached, giving the green tag number and the name of the car, together with a request to the show manager that the car be placed outside the Coliseum, where the exhibitor's driver or the owner will take it away. The lower part of this tag is perforated and forms a call check, which is given to the purchaser. Cars can be moved out and in twice daily—before the show opens in the morning and during the dinner hour in the evening.

There are perhaps many places in Chicago and elsewhere where the price of an exchanged automobile or truck can be juggled to influence buying, but the Coliseum and the Coliseum Annex are not numbered among them. A man might as well attempt to go into a State street department store and buy a suit of clothes at a price lower than that at which it was marked as attempt to get an exchanged automobile or truck at the Coliseum or Coliseum Annex during the show at a price lower than that which is marked on the green tag.

Dealers think so well of this plan of inspection and appraisal that it is possible a permanent committee may be appointed by the Chicago Automobile Trade Association whose duty it will be to make inspections and appraisals throughout the year with the thought of elevating the exchanged automobile and truck business to the plane where it rightfully belongs.

Green Tag No.

Name of Car

SOLD

Thos. P. Convey, Show Manager:

Please have this car placed on Wabash Avenue, opposite Coliseum Annex.

Date

We agree to have OUR driver there to take the car away.

Name of Firm

By

O. K.

Will call check

Green Tag No.

Make of Car

Facsimile of Red Card Which is Attached to Car After Sale and Carries Orders.

NEW KISSEL DISTRIBUTOR FOR NEW ENGLAND.

William F. Aldrich, formerly of Providence, has bought out the entire Kissel interests in New England, taking over the agency for both passenger cars and trucks and also their building at 940 Commonwealth avenue, Boston. This building is directly opposite the new armory. The main entrance to the sales room is on Commonwealth avenue, and the entrance to the service station is on Pleasant street.

Many changes will be made in the building and a new sales organization will be put on immediately.

Mr. Aldrich has been closely connected with the interests of the New England Velle Co. for the past two years. The new company will go under the name of the New England Kissel Co. and will show all of the "One Hundred Point" Six models. Service will be inaugurated at once and Mr. Aldrich proposes to keep the service station open both day and night including holidays, so that all Kissel users can have immediate attention.

Special equipment and complete stock of parts will be carried to take care of these several lines of automobiles. By handling these in conjunction and by using one complete floor of this building for service—and service only—will assure all customers of the promptest attention and the highest grade mechanical work.

William H. Taylor, who was formerly connected with the Kissel interests, will be on the floor to meet his old friends. Mr. Taylor needs no introduction to the Boston automobile public, as he has been associated with some of the larger companies there for many years.

NEW WILLYS-OVERLAND PRICES IN EFFECT.

The Willys-Overland Co. Inc., Toledo, O., has advanced prices on its cars. The new prices, which went into effect on April 1, follow:

Model	New Price
Model 90 touring.....	\$850
Model 90 roadster.....	835
Country club.....	875
Model 90 sedan.....	1340
Model 85-4 touring.....	965
Model 85-4 roadster.....	965
Light six touring.....	1195
Light six roadster.....	1195
Light six coupe.....	1420
Light six sedan.....	1620
Willys six touring.....	1450
Willys club six.....	1450
Willys six sedan.....	2045
Willys-Knight four touring.....	1625
Willys-Knight four coupe.....	2275
Willys-Knight eight touring.....	2100
Willys-Knight eight sedan.....	2800
Willys-Knight eight limousine.....	2900
Willys-Knight eight town car.....	2900
Model 90 panel delivery wagon.....	865
Model 90 express delivery wagon.....	840
1200 pound express delivery wagon.....	975

The war tax is not included in any of the new prices listed here, which are all f. o. b. Toledo.

New Maryland Motor Car Laws

Jail Sentences Provided For On First Conviction In a Number of Instances—Higher Registration Fees

New laws governing motorists in the State of Maryland are now in effect and jail sentences are provided for on first conviction in a number of instances. The maximum speed in the downtown districts is 15 miles an hour, 20 in outlying sections and 35 in open country, with violations of such as prima facie evidence of recklessness.

In the city of Baltimore beginning June 1, traffic cases will be tried in one court, which will be held at the central police station. Governor Harrington will appoint a justice to conduct the court. By centralizing these cases the several police courts throughout the city will be relieved of this work and the decisions will be given a uniformity which hitherto has been lacking.

Driving while under the influence of liquor, failing to stop and render assistance after an accident excessive speeding and using cars without proper authority are offenses for which upon conviction jail sentences of from 30 days to two years and a fine also can be imposed. Commissioner Baughman probably will institute a sight test in examinations for drivers' cards, which are made obligatory under the amended law.

Pneumatic tire machines will be charged for licenses at the rate of 60 cents a horsepower, and public cars not operating on schedule, at the rate of \$1.20 each horsepower. Solid tire truck rates are \$20 for one ton, \$40 for two ton, \$60 for three ton, \$100 for four ton, \$150 for five ton, \$300 for six ton and \$500 for seven-ton. Unless they have been licensed here previously, six and seven-ton truck licenses will not be granted. The charge for trailing cars will be at the rate of \$10 for the first ton and \$20 for each additional ton until the seven-ton limit is reached. Trailers with metal tired wheels will be charged at double rates.

Motorcycle licenses will be \$5, with a tax of \$3 for a side car. A special in-transit license for dealers bringing new cars into the state will cost \$3.

CHEVROLET STOCKHOLDERS ASKED FOR CONSENT TO SALE.

Notices have been sent out to the stockholders of the Chevrolet Motor Co. asking for their consent to the sale of the company's assets to the General Motors Corporation. The notice reads as follows:

"General Motors Corporation has made an offer to your company to purchase all of its assets, property and good will, exclusive of 450,000 shares of General Motors common stock now owned by your company. The purchase price is to be 282,684 shares of General Motors com-

mon stock and in addition it is proposed that the liabilities of the Chevrolet company are to be assumed by General Motors Corporation.

"At a meeting of your board of directors it was deemed advisable to accept the offer subject to approval of the company's stockholders. If accepted the Chevrolet company would own 732,684 shares of General Motors common stock and be free of all liabilities except such as might arise after the date of transfer.

"The proposed sale has already been consented to by a majority in interest of the stockholders of the Chevrolet company and a form of consent is enclosed herewith for your signature if approved by you."

FLETCHER CARBURETOR MOVES INTO A NEW PLANT.

L. V. Fletcher & Co., well known carburetor manufacturers of Long Island City, N. Y., have expanded their factory facilities by moving into the plant of the Neptune Meter Co., 192-200 Jackson avenue, Long Island City, New York. The Fletcher Carburetor is manufactured in the Neptune plant complete in every process from the rough casting to the finished product and has a plant capacity of over 2500 carburetors per day.

In addition to the top and side outlet models made for all makes of cars and motor vehicles, the company manufactures a special model for Fords known as the "Trident." The company have closed a contract with the Davis Service Station of Buffalo, N. Y., to handle sales and service on their product in Buffalo. It also has sales and service stations on their carburetors in the leading cities of the United States.

WILL ISSUE TRADE ACCEPTANCE MAGAZINE.

The National Trade Acceptance Bureau, Inc., has announced the publication of a monthly magazine devoted to the trade acceptance. It will contain, each month, authoritative articles by government officials, leading exponents of trade acceptance, experience of users and methods used to introduce it among their trade, legal opinions, new rulings for the Federal Reserve Board, and a complete department of "Questions and Answers" for the benefit of subscribers. Special departments will be devoted to the acceptance as applied to foreign trade, both export and import.

The office of publication will be at 84 Nassau street, New York, and the subscription price has been fixed at \$3 per year. The first issue will appear during the month of May.

Activities of Prominent Men and Other

Joseph C. Weston has been elected vice president of the United States Tire Co. He came up from the U. S. tire ranks through the Morgan & Wright division, first as salesman, then as sales manager, and next as secretary. J. Newton Gunn, president of the company, has been re-elected. The other officers are: Vice presidents, Charles J. Butler and Ernest Hopkinson; treasurer, W. H. Blackwell; assistant treasurer, John Williams; assistant secretaries, John D. Carberry and P. O. Eckhart. The board of directors, of which Col. Samuel P. Colt is chairman, consists of J. N. Gunn, J. C. Weston, C. J. Butler, E. Hopkinson, Walter S. Ballou, Nicholas F. Brady, James B. Ford, Lester Leland, George S. Shugart, Homer E. Sawyer and Elisha S. Williams. George S. Shugart has been appointed general manager of branches by the company, succeeding O. S. Tweedy, who has resigned.

John H. MacAlman, president of the Boston Automobile Dealers' Association and vice president of the National Automobile Dealers' Association, will be a delegate to the sixth annual meeting of the Chamber of Commerce of the United States to be held in Chicago on Wednesday, Thursday and Friday of this week.

The Cleveland Tractor Co. and the Weidely Motors Co., Indianapolis, Ind., have established closer relations. George Weidely, vice president of the company bearing his name, becomes associate engineer for the tractor company. The latter company sends A. F. Knobloch, its general manager, to the Weidely plant as general manager. Each executive spends two days a week in the other plant. W. H. Knobloch, a brother of A. F. Knobloch, has been made production manager for the Weidely company.

O. S. Comer has been appointed assistant foreign sales manager by the J. I. Case T. M. Co., Racine, Wis. He has been with the Case organization since 1910, when he was a collector at the Indianapolis branch. He did collection work for various branches and finally was sent to Boston as salesman. He then went from Boston to Calgary, back East to Philadelphia, and then to Lansing, as assistant branch manager.

W. H. Gaulke has resigned from the A. B. Specialty Co. and formed the Wm. H. Gaulke Co., 764 Windlake avenue, Milwaukee. The new company will manufacture various automobile specialties in sheet metal.

I. K. Schnaitter has been elected assistant secretary and treasurer of the Willard Storage Battery Co., Cleveland, O. He was formerly credit manager of the company.

Cassius F. Baker will act in the capacity of supervisor of agencies for the Templar Motors Corporation, Cleveland, O.

Henry T. Myers has succeeded George N. Jordan of the Studebaker Corporation, Boston, Mass. During the past



W. L. Agnew, Liberty Wholesale Representative in South.

three years he has served as commercial car sales manager for the company at its main offices at South Bend, Ind., and will continue to exercise supervision over the truck business of the company.

K. B. MacDonald, Buffalo, N. Y., has been commissioned lieutenant commander and put in charge of the naval air craft factory at the League Island yard in Philadelphia. Mr. MacDonald was the vice president and general manager of the Curtiss Aeroplane Co.

E. A. Hornbostel has been appointed manager of the Chicago branch of the Findelsen & Kropf Manufacturing Co. Mr. Hornbostel has been with the concern for some time and will be in a position to handle sales and render Rayfield service in a satisfactory manner.



E. E. Vreeland, President Abbott-Downing Truck and Body Co., Concord, N. H.

Frank McDonald, who was formerly wholesale manager for the Mabbett-Bettys Motor Car Co. of Rochester, N. Y., distributor of the Cadillac, has been appointed a district sales manager of the Saxon Motor Corporation, Detroit.

Otis R. Cook has been re-elected as a director and general sales manager of the Kelly-Springfield Tire Co. He is planning an extensive southern trip and intends to locate branches at Charlotte, N. C., and another in Jacksonville, Fla. An extension of his trip to Cuba is also in view, as the company's business in the city of Havana is a large one.

George N. Jordan has been made general manager and treasurer of the Kenworthy Co., Providence, R. I. He was for three years a manager of the Boston branch of the Studebaker Corporation.

Vernon W. Thompson has severed his connection with the Ellison Motor Co., Haverhill, Mass., and has joined the Riverside Garage, Inc.

H. J. Saizow is the manager of the Tire Sales Co., which has recently opened at 811 Locust street, Des Moines, Ia. He was formerly in Dallas, Tex.

C. F. Eminger has resigned as sales manager of the Splittdorf Electrical Co. of California to become director of sales for the Dayton Electrical Manufacturing Co., Dayton, O. The Dayton company, which Mr. Eminger joined, is manufacturing a new line of Ford starters and motor boat lighting outfits. Vincent G. Apple, formerly president of Apple Electric Co., is the Dayton vice president and general manager.

H. C. Bradfield, formerly advertising manager of the King Motor Car Co., together with F. A. Vollbrecht, have formed the Bradfield company, advertising promoters and agents, with offices at No. 1401 Kraage building, Detroit, Mich. Mr. Vollbrecht is president of the company and Mr. Bradfield vice president and general manager.

W. L. Agnew, formerly advertising manager of the Chalmers Motor Co., has been appointed manager of the southern district in the wholesale department of the Liberty Motor Car Co., Detroit, Mich., and will have headquarters at Savannah, Ga.

R. F. Hodgkins, sales manager of the Studebaker Corporation, has resigned. He joined the company's organization five years ago, first as manager of the New York branch and later as assistant to L. J. Ollier. He has made no announcement concerning his plans for the future.

G. L. Henry has become president of the Horse Shoe Tire Co. of New England. This company has just been formed to distribute Horse Shoe tires in the East and has offices at 885 Boylston street, Boston. He was formerly New England district manager for the Stewart-Warner Speedometer Corporation, Chicago. A. E. Marquard succeeds Mr. Henry as district manager.

Personal News of Motor Industry in Brief

Chester N. Weaver has secured the Studebaker agency for the entire state of California, taking over the territorial establishment maintained in San Francisco by the Studebaker Corporation. Mr. Weaver was for a time factory representative for the Studebaker in San Francisco, after which he took an agency for several counties.

O. L. Blanchard has been made district manager for the Fruehauf Trailer Co., Detroit. In his new duties he will have charge of both southern and middle western territory.

A. H. Wisner has been appointed manager of the newly established division of the Colt-Stratton Co., 109 West 64th street, New York City. Mr. Wisner has had considerable experience in the truck line. During 1917 he was with the Willys-Overland commercial car department and manager of the Yonkers branch. Later he represented the Service Motor Truck Co. of Wabash, Ind., in New York City.

A. E. Maltby has been elected president of the Philadelphia Automobile Trade Association. "Co-ordination and co-operation" will be the slogan of Mr. Maltby's regime. The spirit of this slogan will animate officers and members alike in their efforts to improve conditions in the automobile business. Other officers were elected as follows: Vice president, Louis C. Bloch; secretary-treasurer, J. E. Gomery; directors, L. J. Eastman and J. H. Fassitt, in addition to the officers; membership committee, C. R. Cunliffe and T. S. Johnston, in addition to the officers.

E. A. Field has been elected president of the Field Motor Co., Grand Rapids, Mich., and the following officers were elected: Vice president, B. E. Parks; secretary, C. G. Saunders; treasurer, W. Patworth; directors, W. F. Shaw and the officers.

E. D. Davis has resigned his position with the Stockell Motor Car Co. to accept a position with the Herff Motor Corporation, which company will open branches in Nashville, Tenn., Birmingham, Ala., and Little Rock, Ark. Mr. Davis will have future management of the Little Rock branch, which will control the State of Arkansas, on the Elgin and Briscoe motor cars.

Richard D. Willard has taken charge of the Newark branch of the Hudson company, located at 866 Broad street. Mr. Willard takes the place of DeWitt Voorhes, who recently entered the aviation service.

Earl H. Scripps is now manager of the Victor Motor Co., Omaha, Neb., distributor of the Hupmobile, Mercer and Roamer cars. Mr. Scripps has been in the selling force of this company some time, coming here from Des Moines, where he was connected with the Hupmobile Sales Co. for several years.

Robert J. Walsh, formerly advertising manager of the Maxwell Motor Car Co., Inc., has joined the Fred M. Randall Co.,



A. F. Knobloch, Manager of the Cleveland Tractor Co.

advertising agents of Detroit.

Albert Guyot, who has been discharged from the army as the result of injuries received while on active service as an airplane pilot, has entered into partnership with N. Causan as a firm of consulting engineers. He was winner of third prize on a French Delage in the 1914 Indianapolis race. Engineer Causan has a reputation as designer of high efficiency racing engines, having produced successful boat and car engines for Delage, Panhard-Levassor and Despujols.

Clairence S. Walker has resigned as patent counsel of the Packard Motor Car Co. to become associated in the same capacity with the Wire Wheel Corporation of America, Buffalo, N. Y. For seven years Mr. Walker was assistant examiner in the United States patent office at Washington, previous to his connection with the Packard company.



Albert Guyot, Famous Car Pilot, Starts Engineering Firm.

Walter Campbell, formerly with the Hupp Motor Car Corporation, has been appointed assistant supervisor of materials at the Harroun Motors Corporation, Detroit, Mich.

William P. Barnhart has been appointed assistant sales director of the United States Motor Truck Co., Cincinnati, O. His headquarters will be in Washington, where he will handle the business of the Stewart Iron Works and the United States Motor Truck Co.

J. H. Teagan succeeds Charles Denby, who has entered government service. Mr. Teagan will be export manager of the Hupp Motor Car Corporation, Detroit. He was formerly assistant to Mr. Denby.

O. S. Tweedy has resigned as manager of general branch sales of the U. S. Tire Co. and has been elected vice president of L. A. Young Industries, Inc., Detroit. He will leave April 15 and start active work in Detroit May 1.

E. L. Lick is now manager of the car order department of the Simons Sales Co., Toledo, O. He recently resigned as assistant manager of the car order department of the Willys-Overland Co.

Benjamin S. Rosenberg has been appointed manager of the New York office of the United Smelting and Aluminum Co., Inc., New Haven, Conn. He was formerly connected with Post Van der Burg & Co.

R. C. Bridge, who has been associated with the Willard Storage Battery Co. on the Pacific coast, has been appointed manager of the San Francisco district. He will have headquarters at 1380 Bush street, San Francisco, Cal.

C. S. Harper will operate the Willard service station at Seattle. He was formerly district manager for the Willard Storage Battery Co. at San Francisco, Cal.

L. R. Johnson has been elected treasurer of the Jones Motor Car Co. He was for the past three years auditor of the company.

Clifford Ireland has been appointed chairman of the Legislative Committee of the American Automobile Association, succeeding O. I. Yellott, who has resigned. Mr. Ireland has been head of the Touring Board and his place has been taken by Carl G. Fisher.

Henry C. Limbach is now equipment engineer of the Strong, Carlisle & Hammond Co., Detroit, Mich. He was former production manager of the Zenith Carburetor Co.

G. A. Freeman has become associated with the C. R. Wilson Body Co. in the airplane body division. Mr. Freeman has been succeeded by Andrew Lehr, formerly connected with the Studebaker and General Motors interests.

N. J. Finch is now manager of the Detroit branch of the Bearings Service Co. He succeeds E. G. Volker, who has been promoted to be manager of the New York branch. Before coming to Detroit Mr. Finch was assistant manager of the Bearings Service Co. at Cleveland, O.

Auto Trade Goes Into High For Liberty Loan

Associations Throughout the Country Are Devoting Great Energy and Much Time to Raising the Big War Fund

While this is the busiest season of the year with the automobile tradesman, whether a car, tire or accessory dealer, yet few of these men are devoting much of their time at present to their immediate business, but have become actively allied with some one of the various committees that are working at Uncle Sam's business, which just at present is making war, and this business needs vast sums of money.

No men in America, taken as a class and representing a certain line of trade, are devoting any more time, money or energy toward the Third Liberty Loan than the thousands of men engaged in some one of the branches of the automobile trade. In the larger cities the automobile trade associations have organized committees who have practically abandoned all business effort except that of reaching their quota of Liberty Bonds.

Many millions of dollars will be raised by these efforts that otherwise might have been slow in coming if it was subscribed at all, and great credit is due these men who have diverted their time from their business at a time when more than any other in the year they should "make hay while the sun shines."

PHILADELPHIA DEALERS

WILL RAISE \$1,000,000.

The Philadelphia Trade Association made a rapid start on its first drive for the Third Liberty Loan, raising nearly 20 per cent. of its quota the first day, or \$170,000. The trade has been divided into three groups and are after a total of \$1,000,000. There is a motor car, tire and accessory division. A. E. Maltby is chairman of the Group A, motor cars, and W. A. Almy is vice-chairman. The members of this committee are: C. R. Cunliffe, A. M. Pollock, S. Stankowitch, S. R. Blockson, C. W. Lloyd, H. L. Bogardus, F. G. Browning, J. J. Smith, E. W. Burnshaw, Jr., O. W. Doolittle, Benjamin Hoffman, E. M. Bartlett, T. S. Johnston, H. B. Harper, W. G. Herbert, A. W. Lockwood, J. C. Bartlett, N. G. Wilson, A. W. La Roche and G. P. Parker; Group B, tire division, is composed as follows: Chairman, W. R. Walton; vice-chairmen, Garfield List, E. H. Fitch, F. A. Kissel, D. D. Yard, S. M. Beatty, H. D. Worthington, R. L. Warren, Charles E. Fellows, E. B. Richardson, T. Y. Suttman, Harry G. Fittler, H. E. Elliot, W. F. Metzgar; Group C, accessories, is composed as follows: Chairman, G. B. Shearer, Jr.; vice-chairmen, A. W. Stellwag, E. B. P. Carrier, Albert Streicher, N. A. Petry, C. H. Walz, H. E. Almang, T. Scott Evanson, E. E. Smith, W. J. Little, C. B. Solly, George L. Carroll, E. Fyfe, J. H. Nash, W. L. Batt, S. C. Simon and F. E. Stow.

CHICAGO ASSOCIATION OUT

AFTER QUOTA OF \$1,800,000.

The Chicago Automobile Trade Association, which raised \$969,000 subscriptions for the Second Liberty Loan, is out to make its quota of \$1,800,000 under the leadership of its president, George H. Bird, who is chairman of the Liberty Loan Drive Committee. He is also vice chairman of the Passenger Car Division. The other vice-chairmen of the sub-committees are: Trucks, E. J. Kilborb; accessories, Ward Perry; tires, A. W. Moore; wagon and body builders, William J. Hughey; garages and repair shops, H. E. Halbert; liverymen, F. M. Johns; motorcycles, R. C. Crist.

There are also four sales managers working in the campaign who are called captains, and they head the various divisions as follows: Passenger cars, R. B. Barton; trucks and accessories, M. Ferguson; tires, wagons and body builders, J. R. Carnahan; garages, repair shops, liverymen and motorcycles, C. E. Sutton.

Boston Dealers Start Campaign

Every Dealer and Employee Connected with the Trade in the Hub Will Be Solicited.

Every man in the Boston motor vehicle trade and every employee is being solicited to buy Liberty Bonds by a committee of the Boston Dealers' Association, of which George B. Kimball of the Henley-Kimball Co. is chairman and which is made up of about 40 members of the motor car, truck, tire and accessories trade of that city.

President J. H. MacAlman of the Dealers' Association presided at a meeting of the committee at Hotel Lenox and afterwards turned over the meeting to Mr. Kimball, who outlined the plans for the drive. He announced that the entire trade had been divided into sections and that every individual connected with it in any way will be canvassed. He said that instead of organizing teams the members of the committee will do the work individually. He urged the workers to make every effort to get in their pledges quickly and to make daily reports. A list of banks was read which will handle the buying of bonds for people on the \$1 a week basis. The committee handling the drive includes: George B. Kimball, chairman; Day Baker, G. M. Leghorn, F. A. Hinchcliffe, J. J. MacGregor, F. E. Wing, J. L. Judd,

Otto A. Laston, J. S. Donovan, A. L. Danforth, C. E. Fay, A. H. Sowers, C. S. Henshaw, R. P. Page, Jr., J. L. Snow, C. P. Rockwell, J. M. Linscott, Lester Perrine, W. J. Connell, F. W. Stockbridge, Frank P. Allen, Norman Halliday, J. W. Bowman, J. S. Hathaway, L. B. Sanders, I. M. Boles, J. J. Harrington, George Crow, Russell Green, John B. Wilson, John Coward, Wallace Page, A. P. Underhill, Charles Bates, D. W. Palmer, W. H. Stevens, John H. Johnson, George W. Canterbury, J. F. Utterback, D. J. Fleming, Mr. Henderson, Mr. Brackett and Mr. Mitchell.

RHODE ISLAND FORD AGENT

TAKES \$100,000 BONDS.

Dutee W. Flint, the well known agent for Ford cars in Rhode Island and Eastern Connecticut, gave the attendants in one of the Liberty Bond booths in Providence a mild surprise when he stepped up to the window and stated that he would buy a few more of the anti-autocracy securities.

"How many?" asked the lady in the booth.

"Well, \$100,000 worth this time," said the genial agent, as he reached for his fountain pen to execute the necessary document to complete the transaction.

New York Trade Will Have Rally

Meeting Will Be Held Under Rainbow Division of the Special Liberty Loan Committee.

Members of the automobile trade and allied lines in New York City are planning a rousing rally as a means of injecting the last iota of enthusiasm into the present Liberty Loan campaign which is being conducted by the various motor car organizations. The meeting will be held in the Automobile Club of America and will be under the auspices of the Rainbow Division of the Special Liberty Loan Committee for the Automobile and Accessory Trades. Cooperating with this committee are the National Automobile Chamber of Commerce, the Automobile Dealers' Association of the city of New York, the Automobile Club of America, the Brooklyn Motor Vehicle Dealers' Association and the Bronx Automobile Dealers' Association.

One of the features of the evening will be a talk by Sergeant Harold Wright of the French Flying Corps and the Lafayette Flying Corps. He is a New York

boy who has just returned from the fighting front after nearly two years in the thick of it.

General Manager Alfred Reeves of the National Automobile Chamber of Commerce, who has just made an extended tour of the automobile factory cities, will make an address on the motor car industry in its present relation to the prosecution of the war.

The rally is to be an invitation affair and cards may be obtained from Charles A. Stewart, general manager of the Automobile Dealers' Association, Hotel Woodward. Application should be made at once as the capacity of the ball room of the club is limited.

Charles M. Brown, president of the Automobile Dealers' Association of New York City, is chairman of a trade committee which raised \$5,000,000 on the second loan, and it has a quota of \$12,000,000 on the third loan. A force of 100 salesmen will canvass the trade.

The members of the general committee are: Chairman, Charles M. Brown, the Winton Co.; vice-chairman, Charles E. Miller; secretary, Charles A. Stewart; R. M. Johnston, the White Co.; E. S. Hare, Packard Co.; F. G. Carrie, New York Marmon Co.; C. E. Reiss, Charles E. Reiss & Co.; A. G. Southworth, Buick Motor Co.; Walter E. Woods, Van Cortlandt Vehicle Corporation; W. C. Poertner, Poertner Motor Car Co.; Harry Houpt, Hudson Motor Car Co. of New York; H. J. De Bear, Maxwell Motor Co.; I. M. Uppercue, Cadillac Motor Co. of New York; C. H. Larson, Oldsmobile Co. of New York; E. Lescaris, 114 West 54th street; John F. Plymmer, Liberty Motor Car Co.; William Haradon, Royal Garage; John B. Elsey, Bronx Auto Dealers' Association. Representing Brooklyn Automobile Sales Section: Arthur E. Randall, Brooklyn Motor Dealers' Association; A. D. Corwin, Buick Motor Co.; C. J. Maxson, Reo Motor Car Co.; C. M. Bishop, Bishop, McCormick & Bishop; William H. Kouwenhoven, 2 Remsen place. Representing New York Accessories Section: J. C. Nichlos, 161 Broadway; Louis Mansbach, care Times Square Auto Co.; William A. Allen, 16 West 61st St.; F. W. White, Stewart-Warner Co. Representing Brooklyn Accessories Section: D. D. Martin, 1874 Bedford avenue; Frederick Brecht, 1580 Flatbush Ave.; Robert P. Lumley, 1408 Newkirk Ave.; Charles F. Batt, 998 Bergen St.

EMILE-JELLINEK-MERCEDES DIES IN SWITZERLAND.

A few days ago the newspapers carried a short news dispatch from Geneva, Switzerland, announcing the death of Emile-Jellinek-Mercedes, a wealthy automobile manufacturer. Few persons, however, recognized in this name the man who developed the Mercedes car and made the name synonymous with speed and endurance on the race tracks of many countries. Jellinek perfected this car while in control of the Daimler Motor Co., and named it the Mercedes in honor of his daughter.

War Thins Out Ohio Repairmen

Over One-Third of Mechanics, Machinists, Repairmen and Chauffeurs Have Gone Into the Army Service

The motorists of Ohio are going to have to do a large part of their own repair work during the summer touring season, according to announcement just made by the War Service Committee of the Ohio Automobile Trade Association, whose headquarters are located at Columbus.

Over one-third of the mechanics, machinists, repair men, tire men and chauffeurs of Ohio have already gone into the army, or will be taken in during the next 30 days.

It is going to be a mighty urgent need that will allow a motorist to telephone to a service station for service from now on, according to the War Service Committee. Just why this is so is brought out by a questionnaire which was sent out by the War Service Committee of the Ohio Automobile Trade Association to the 4500 automobile tradesmen in Ohio last month. Because this is the beginning of the busy season in the trade, only 560 returned the questionnaire filled out, but it is significant that those who sent in their answers are representative of the entire trade, and are located in all sections of Ohio, so a fairly accurate census of the mechanics was secured.

These establishments range in size from the one-man shop to the large service stations in the major cities, employing 25 to 50 men each.

According to the census, these 560 places of business employed 4915 men on April 1, 1917. This is an average of eight men per shop. Taking this as indicative of the entire retail automobile business in Ohio, there were approximately 40,000 men employed in the various branches a year ago in Ohio.

Of these, it is estimated that 21 per cent., or over 8400 men, have already entered Uncle Sam's service in some capacity or another. Not only is this the case, but the proprietors of the various service stations, garages, repair shops, etc., all over Ohio report that 7200 more will be in the service before June 1st of this year. This means that over 15,000 men will be in the service by June 1st.

Of course the taking away of so large a proportion of skilled laborers from an industry so complex as the automobile business has created a number of new and perplexing problems for the proprietors of the various establishments. One of the questions asked upon the questionnaire was, "How do you plan to meet the shortage of men in your place of business?"

Many methods were suggested in answer to this question, one of the most popular being the intention of training younger men to take the places of those who are of military age. Such a course will be an eventual benefit to the industry, as there will be a larger supply of

trained men to rely upon than ever before.

Another suggestion made by many of the larger establishments was the employment of women to take the places of the men who have been called away. Several of them have already been experimenting with women and report that they are rendering most satisfactory service.

Still another method, in line with the suggestion of the government for the working out of more economical methods of doing business in all lines, is the use of a greater amount of labor saving machinery, thus releasing the men for service without disarranging the routine of the shop.

One man frankly stated, in answer to this question, that he intended to work a little harder himself, while still another even more frank, laconically answered "work nights!"

The Ohio Automobile Trade Association is now engaged in classifying the reports and picking out the best suggestions offered. These will be incorporated in the next bulletin of the association, which goes to all tradesmen throughout Ohio monthly.

"In this way we hope to be able to render practically 100 per cent. efficient service this summer," said A. E. Mitzel, Canton, president of the association. "Of course, the loss of over one-third of our mechanics makes this difficult, but the government can have another third of them whenever they need them."

PRICE OF AMERICAN CAR IS LOWERED.

The American Motors Corporation, Plainfield, N. J., has announced a cut in the price of the five-passenger touring car from \$1695 to \$1595.

At a recent meeting of the company Robert Bursner was elected president and Louis Chevrolet was again elected vice president and chief engineer. George W. Cravens was elected general manager and Proctor W. Hansl secretary-treasurer. The company will sell \$100,000 treasury notes to provide additional capital.

JERSEY CARS REGISTERED FOR USE BY THE RED CROSS.

The Hudson County New Jersey Automobile Club has voted to place the car of every member at the disposal of the Red Cross for the convenience of convalescent soldiers. A letter was received from the government suggesting that all cars be registered with the authorities for this purpose.



An Omaha newspaper prints the following short but significant news item:

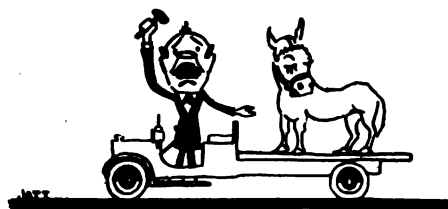
"The passing of the horse drawn delivery in Council Bluffs will be seen Saturday, March 30, when the combined livery stock in that city will be sold at auction.

"Horse drawn funeral outfits will not be seen here after Saturday. The automobile has run the horse out of business in that line.

"A \$50,000 stock of horses, carriages, harnesses, hearses, ambulances and buggies will be sold by I. N. Minnick, owner of the outfit. When he came to Council Bluffs 22 years ago there were 13 livery barns, and he, with his father, bought out six of the barns.

"At one time it was a big business," he said, "but now the automobile is the business." He will have a new line of funeral cars."

Such an item now calls for little comment except that had Mr. Minnick made



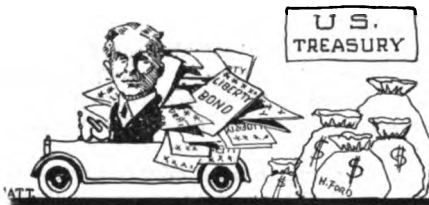
a similar announcement five years ago his sanity would have been questioned. His present action, however, indicates a fairly far sighted business policy, as the day is to come when the motor car, truck and tractor will not only have entirely superseded the horse, but the latter's presence on a city thoroughfare will call for the attention of the law.

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The finance committee of the Du Pont Co., Wilmington, Del., authorized subscriptions to the Liberty Loan which will total probably \$25,000,000. The exact figure depends on the amount of Delaware's subscription from other sources. The company will place \$8,000,000 outside of the Delaware district and has authorized additional subscriptions to duplicate whatever Delaware may subscribe up to \$17,000,000. This is the maximum amount Delaware is called upon to give.

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In less than five hours of the first day of the Detroit campaign for Liberty Loan bonds of the third issue, the city subscribed for nearly half of its full quota. The exact figures announced at a meet-



ing at which Secretary of the Navy Daniels was the principal speaker, were \$15,354,650. This total was made up of 47 subscriptions, the biggest one being for \$6,000,000, by Henry Ford.

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The police and fire department of Wattertown, Mass., know what team work is and when it comes to staging a spectacular arrest could give cards and spades to the average producer of movie thrillers. Recently when a fearless, audacious group of Cambridge youths set out on a joy tour in an undertaker's car, the policemen who were notified of the theft, learning in which direction the culprits were proceeding, called upon the fire station located on the way to back out the motor fire truck across the road and form a barrier. This proved an effective ambush as the driver of the stolen car in attempting to circuit the end of the truck brought his chariot to grief on the curbstone. It was a successful sortie on the part of the police and firemen, as in addition to the driver and his companion on the front seat, seven other members of the now joyless party were found in the rear compartment of the car.

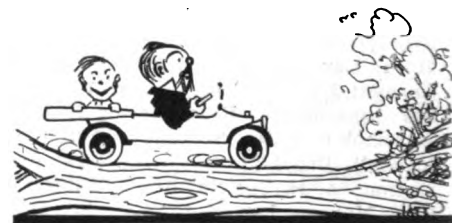
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Thomas Harvey, a motorist of Waltham, Mass., will think a second time hereafter before throwing into high and pressing on the accelerator in response to his curiosity, as the sudden burst of speed occasioned by this action led him into court, where he was fined \$10. He was driving toward the police station in West Newton, Mass., when a police ambulance emerged from the entrance. His curiosity as heretofore stated urged him to follow the police vehicle and he evidently forgot that the operator of the latter vehicle was a privileged character,



as when he let out at the rate of 42 miles an hour, Harvey did likewise, with the result that he fell into the hands of the law. Patrolman Ames Mills, who was riding in the ambulance must have taken the same view of the law as did his driver as upon noting that Harvey was following the ambulance he took his registration number and testified in court as to the speed at which the police vehicle was traveling, which evidence was evidently used in convicting the motorist.

This incident should have a paradoxical as well as humorous aspect to law makers, as well as the minions of the law, as it savors much of the ancient autocratic ruling that "The King can do no harm." Perhaps, however, the aforesaid minions have not the stretch of the imagination necessary to see this incident in the same light that it would appeal to the judicious mind. It would



not, however, take much horse sense to realize in what a ridiculous light such a case places the statutes making such a thing possible.

The law enforcing the speed limit is based on the assumption that the automobile becomes an engine of destruction to life and limb when exceeding 25 miles an hour and here we have the bewildering spectacle of an agency of mercy and succor fulfilling the letter of the law as regards its definition of "unsafe and dangerous operation of a motor car."

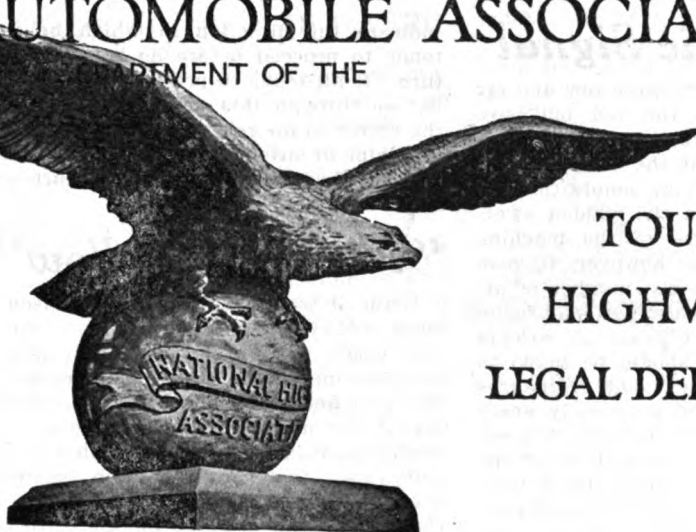
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The Massachusetts State Highway Commission during the month of March issued nearly 22,000 license plates, or 44 per cent. more than for the same period last year. The registration of motor trucks for the same period also showed a large increase. Since the first of the fiscal year, on Dec. 1, 1917, the Highway Commission has registered 86,820 passenger automobiles, or 10 per cent. more than in the same period last year. The registration of auto trucks for the four months period was 23,955, or only 2053 less than for the entire fiscal year of Nov. 30, 1917.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

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9 PARK STREET, BOSTON, MASSACHUSETTS

Proper and Reliable Equipment for the Car

Inspection of Brakes and Adoption of Efficient Signalling Devices Would Reduce Number of Accidents

WHILE opposed to unnecessary, superfluous and restrictive legislation, the National Automobile Association membership realizes that to establish safer conditions on the highways and to obtain more satisfactory operating conditions for motor vehicles, there are a number of reforms that must be accomplished in a legislative way and which are of an imperative character.

Each year brings greatly increased numbers of automobiles on the highways and city thoroughfares and conditions already obtain in most of the large cities that the traffic officials are at a loss to cope with. This year this traffic congestion will be greater than ever before and practical steps must be taken to prevent the increase in accidents that would under normal regulations accompany the more general use of cars in the same limited areas.

The most important step of all to be taken, according to opinions given by city officials and traffic men in various cities, as well as manufacturers, dealers and motorists, is that such action be taken as is necessary to insure that every car on the road has its braking equipment in good working order at all times. Through this means the automobile is controlled, if it is in proper working condition, but otherwise it is not and the car becomes a dangerous instrument in the hands of even the most careful driver.

While as yet no national, state, county

or city legislation has been enacted to remedy this common source of accident, it is now being advocated in a number of quarters that some form of periodical inspection be made of the braking equipment of all motor cars as a means of eliminating the majority of fatalities and damage resulting from braking troubles.

Over 60 per cent. of the accidents caused by brake troubles could be avoided if the proper inspection of brakes was made at least once each season, according to a statement made by one of the officials of the Motor Truck Club of America, while others interested who have consulted with prominent police and insurance officials, say the movement will eliminate thousands of accidents which are daily occurrences.

While it is believed that the evils in the situation due to this cause would be largely eliminated if the passenger car operators would go to their dealer or a garage and have their brake equipment inspected at least once a year, or twice, and that similar inspection be made of trucks at least three times a year. Such a plan if lived up to by the majority of car operators would at least put every car within the means of control. Whether or not this can be arrived at by mutual action on the part of the car users remains to be seen, but it is a reform, the merit of which has been so widely recognized, that it will undoubtedly be enforced by legislative action in every state. Such a law could be enacted in

effective form without placing any burden on the motor car owners or entail additional expense except such as they are morally bound to bear out of respect for every other motorist or pedestrian. It would simply be necessary to provide for an inspection of brakes on a car at such times as was convenient to the inspectors, and a severe penalty could be imposed in cases where it was found that criminal neglect was indicated by a condition of the brake assembly on the car that made it impossible to control it within certain limitations to be prescribed by law.

The relation of faulty brakes to the cause of accidents in New York City was made a matter of special mention by Mayor Hylan in a letter sent to Police Commissioner Enright, in which he said:

"Many of the motor vehicles that are running in the thoroughfares of this city are not fit to be out of the shop. The brakes are in such bad condition that it would be impossible to stop the car for some distance even though running very slowly. This is criminal negligence and carelessness. The chauffeur should know the condition of his brakes at all times. When an accident occurs involving the loss of life or serious injury, the car, and particularly the brakes, should be immediately examined, so that the responsibility may be placed where it properly belongs.

Efficient Rear Signaling Device a Necessity

Automatic Signal

Years ago when cars were few and far apart on the roads the red bull's-eye lamp in the rear served its purpose, as it was only seldom that the cars were so close together at turning points that accidents resulted from the sudden swerving from its course of the machine ahead. In the cities, however, it soon became evident from the number of accidents caused by such situations arising from the operation of cars at corners that some measures should be taken to eliminate this danger and ordinances and laws were passed practically every state requiring that the operator of a car extend his hand to indicate if he intended to come to a stop or make a turn. With the general adoption of this regulation the greater percentage of the accidents arising from the uncertainty of a driver's action were eliminated, but signaling with the hand from the car to warn a driver in the rear is useless at night, when the need for such a warning is greatest.

Signaling at Night

That no attempt was made to provide some reliable means of signaling at night was due to the fact that no satisfactory devices were on the market. Now there are a number of these equipments being manufactured, which when installed enables the operator of a car to give a definite signal at night or in the day time, indicating to the operator of a car in his rear whether a turn is to be made to the left or right, or that the car will be brought to a stop. These different signals are set by pressing a button on the wheel.

There is slight grounds for argument against the adoption of legislation requiring the use of some type of automatic signal that will be as effective in the night time as during the day, as if the reason already existed for the hand signaling regulations that are so generally enforced, a means to the same end for night driving is far more imperative. Such a device is no longer necessary solely as a means of safety in city driving, but also at all times, as throughout the country districts on highways leading from one large city to another or to a summer resort, long lines of cars will be seen proceeding in both directions at a rate of 25 to 30 miles an hour with intervening spaces between cars of only a few feet. This fact alone makes the adoption of a practical signal a necessity, if the highway authorities wish to cut down the volume of accidents resulting from congested highways and the danger ever present of side-on collisions resulting from sudden shifts of position of cars without warning to the operators of cars at the rear. Every motorist should immediately see the advantage of equipping his car with a signal that will

indicate the direction in which he intends to proceed before he has made a turn. It all tends to protect himself and car as through this means of signaling the driver in his rear is not liable to run into him or attempt to cut around him when he has his signal set for a turn or stop.

"The Other Fellow"

While it would seem that the reasons were self-evident in adopting a device that would work at night as well as in the day time and at the same time with the least amount of effort so that signaling at the proper time would never be neglected, it is a notorious fact that even self-evident facts never become so with the average person unless pointed out to them. The demonstration of this truth is found in the history of the development of automobile and the legislation that has been incident to it.

Years before speed laws were enacted the sensible motorists realized that legal restrictions would have to be placed on the speed of a motor car before the majority of operators would drive at a safe and sane speed. That legislation would have to be enacted before the proper headlight regulation and signaling would be observed was also known before such measures were actually enacted and this was necessary in face of the fact that every motorist knows that his greatest fear of danger or accident in driving is always of the "other fellow."

The "other fellow" when trailing you along at night on a dark road, a few feet behind and traveling at 25 to 30 miles an hour, has no way of knowing where you are going to turn or when you are going to stop unless you have a signal somewhere in the rear that is visible at night.

Laws Necessary

The need of such legislation is daily becoming more apparent and no matter how strong the feeling is against the policy of increasing the restrictive measures affecting motoring, the motorist should recognize the fact that as long as it is impossible to rely upon the individual operator to take every possible precaution for safety, laws are necessary to compel this action.

A recent instance illustrating this need of more careful regulation was brought to the attention of the public by Commissioner William L. Dill of New Jersey. He had a measure passed in his state requiring that chauffeurs pass a physical examination and actually demonstrate their operating ability. This act, while serving as a protection for New Jersey motorists, does not prevent the operation of cars in that state by reckless drivers from New York and Pennsylvania, so the commissioner is

Reckless Drivers

now urging that those two states pass similar measures. He contends that the mailing of an application, together with a dollar, which is all that is necessary to obtain the privilege of driving a motor car in New York state, is an insufficient means of guaranteeing protection for the public. As an example the commissioner cited the case of a man who drove his car into a subway structure in New York and the accident resulted in the death of two of his companions.

This man had been denied the privilege of operating a car in New Jersey owing to a previous accident, which in the minds of the authorities established the fact that he was irresponsible and reckless.

"It is our belief," said the commissioner, "that had the authorities of New York withheld the license to drive from this man after his conviction in New Jersey the accident would not have happened."

"Care and Caution"

Such cases as these, however, are directly traceable to the car operator, but there are many accidents seemingly unavoidable which would never have occurred had the policy of caution been generally observed. Magistrate House of the New York traffic court in commenting on the increasing number of traffic accidents to children, recently observed:

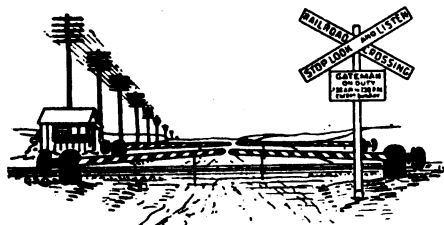
"Accidents have seemingly increased and especially in the case of children. This may be through the fault of the drivers or through that of the victims. In all such cases the true test is did the driver use all the care and caution which a careful and prudent driver would have used under the same circumstances?"

In Massachusetts during the past year there were no less than 17,000 accidents resulting from the operation of a motor car. It would, of course, take a very careful analysis of each case and the cause of these accidents to attempt to place the responsibility, but it is certain that more than 50 per cent. resulted from careless operation of the car.

A large number of these accidents were also due to faulty control of the car resulting from poor mechanical condition or to the lack of equipment such as suggested that would give a car greater protection against collision. It will probably soon be the custom to enact legislation requiring the adoption of any device that has been practically demonstrated as a means of avoiding accidents. Such legislation, however, could in no way be considered of a restrictive nature, as the operator of a car would enjoy as much freedom as to speed and range of operation as he has at present and yet would have the satisfaction of knowing that the possibilities of accident had been greatly eliminated.

Connecticut Issues Grade Crossing Warning

The State of Connecticut has not only been a leader in securing legislation to improve conditions for the operation of motor cars and insure the safety of the



Danger, Stop, Train Coming.

motorists, but has been among the foremost in adopting steps for furthering the campaign for safety in a practical manner.

The rule that "the ignorance of the law excuses none" is quite generally accepted in the courts in passing upon a person's illegal acts, and this fact has been the reason for the deplorable neglect on the part of executive departments following up their duties, as they stand on the ground that their responsibility ends with the enactment of the law. Such an attitude only serves to bring punishment to a guilty party and is only partially effective in bringing about the reform that was the object of the legislation.

In Connecticut, however, the officials believe that by thoroughly acquainting the public with the law and its objectives in a practical manner they not only secure better results in attaining the reforms sought by the statutes, but improve motoring conditions in general by eliminating many of the accidents resulting from criminal operation of automobiles.

To this end the automobile department of the state took space at the recent Bridgeport Automobile Show and in addition to receiving registration fees at the exhibit, gave out various information of interest to motorists.

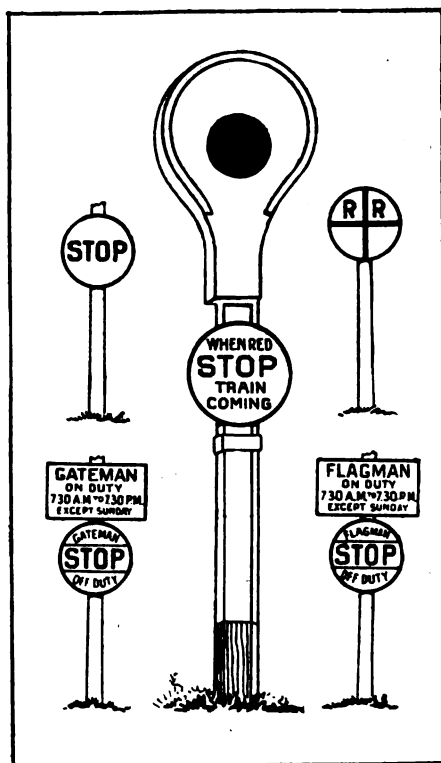
The Public Utilities Commission of Connecticut in its investigations along safety lines found that the railroad grade crossings were a source of increasing danger to motorists. In furthering the safety campaign in this respect it was found that many motorists were entirely ignorant of the meaning of various crossing signs and signals, which fact left them open to great danger. To remedy this condition the commission had a circular prepared showing the various methods of grade crossing protection and what they indicated so that motorists could recognize these danger warnings, understand what they signified, and be on the safe side.

These circulars, which are being widely distributed and were given out at the Bridgeport show by the state representatives, bear the following introduction in addition to the pictures of the various signs and signals as reproduced on this page:

RAILROAD CROSSING PROTECTION.

"Owing to the number of fatal accidents at grade crossings, especially since the increased use of automobiles, the Public Utilities Commission made an investigation with a view of adopting such methods as would more adequately safeguard the public.

"At a joint conference with a Committee of the National Association of Railroad Commissioners it was decided to procure as far as possible, uniform legislation in the several states, establishing a standard system of signs and signals for the prevention of accidents at grade crossings, and a tentative draft of proposed legislation was sent to all state commissions.



Centre: "Danger, Automatic Crossing Signal. Upper Left: Stop, Dangerous Crossing. Upper Right: Distant Warning. Reduce Speed, Railroad Crossing 300-500 Feet Ahead. At Left and Right: Caution, Dangerous Crossing, Flagman or Gateman Off Duty.

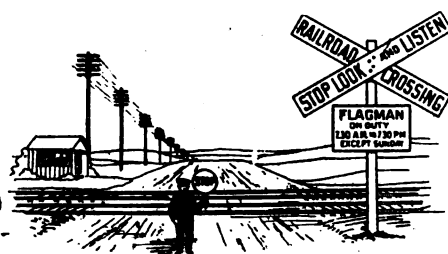
"Our commission presented such proposed legislation to the General Assembly of 1917, resulting in the passage of chapter 373 of the Public Acts of 1917, being substantially similar to legislation



Types of Railroad Signs Located at Crossings.

adopted by most of the other states.

"In addition to the signs specified in said act, authority was given to the Public Utilities Commission to prescribe for



Danger, Stop, Train Coming.

each crossing such system and arrangement of signs and signals as public safety reasonably requires. The commission made a survey of all grade crossings in the state, designating the particular requirements for each and adopting the signs and signals appearing on the accompanying diagram.

"In order to call the attention of the traveling public to these warnings the Commissioner of Motor Vehicles kindly co-operates in the distribution of the diagram and instructions."

This action, as indicated in the circular, is to lessen the confusion that naturally resulted under the old system when different crossing signals were used to indicate the same meaning, making it impossible almost for a motorist to tell what a sign or signal at a grade crossing meant unless he was familiar with it. As it would be impossible for a person to be familiar with all the grade crossings in the country, the only solution of the problem lay in a standard system of signs and signals which would be used in all states.

REGISTRATION PLATES.

The bill introduced in the Massachusetts Legislature to amend the law so that the State Highway Commission could send registration plates by parcel post instead of by express as at present, was held up owing to the fact that a question was brought up as to who would pay for the postage.

As the bill was reported it provided merely that on the request of the applicant the highway commission should send the plates by parcel post, registered or not, as the applicant desired. Under the bill the highway commission apparently was to pay for the stamps. This fact was brought out and the bill was referred back to the Committee on Ways and Means. It is thought probable that when it is reported again it will have been changed to provide that the applicant must add postage and other charges in remitting his registration fee. Heretofore plates have been delivered by express which cost more than parcel post, and motorists for several years have sought a change to lessen the expense.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration

The Stromberg Motor Devices Co., Chicago, Ill., reports net profits for 1917 of \$318,819 before the deduction of war taxes. This is equal to \$6.37 a share on the 50,000 shares of common stock outstanding, as compared with \$5.56 in 1916. The company is prepared to manufacture 35,000 carburetors a month.

bilities to only \$2,600,000, or a working capital of \$13,000,000.

The Essex Motor Co., Detroit, Mich., which was organized last year, will start manufacturing its new motor car at the plant of the Hudson company. Plant No. five of the Studebaker corporation had been leased by the Essex company

The Willys-Overland Co., Toledo, O., has received another order and it amounts to \$10,000,000. This is for the manufacture of shells and brings the Overland munitions contract to a total of \$50,000,000.

The Lozier Motor Car Co., Detroit, Mich., is making five cars daily and it is steadily increasing its production. The company has orders for six months. The officers are: Theodore Friedberg, president and treasurer; Harry Dutzel, vice president and secretary.

The Fedders Manufacturing Co., Buffalo, N. Y., is manufacturing a new model of tubular radiator with cast iron or pressed steel shells and cores of seamless tubes having spiral fins. The top, bottom and sides can be unbolted and removed, thus exposing the tubes when it is necessary to replace any damaged parts or make repairs.

The Pan Motor Co., St. Cloud, Minn., has occupied its new factory building, which is 624 feet long by 170 feet wide. It is built of reinforced concrete and of the monitor roof design, affording light in every square foot of floor space. The work of moving machinery is nearly completed. The building will be used as the principle assembly unit. It is of the most modern type of factory construction and when completely equipped will have a capacity of about 100 assembled cars a day. The company is planning the construction of another factory unit of about the same size. Factory building one is being used for experimental work. The power plant is nearly completed and should be in operation within a short time. The foundation is being laid for the heavy machinery for the drop forge plant, which will be ready about July.

The Prest-O-Lite Co., Inc., has appointed the following firms and individuals as distributors of acetylene products: Wm. T. Shoemaker, 244 W. Water street, Elmira, N. Y.; Plainfield Auto Tire Co., 407 Watchung avenue, Plainfield, N. J.; Ideal Auto Co., 129-31 W. Third street, Salida, Col.; Auburn Vulcanizing and Storage Battery Co., 18 Clark St., Auburn, N. Y.; R. W. Whipple, Whipple building, Binghamton, N. Y.; Perfection Storage Battery Co., 1175 Bedford avenue, Brooklyn, N. Y.; Flushing Storage Battery Co., 92 Broadway, Flushing, N. Y.; Central Garage, 748 Broadway, Kingston, N. Y.; George W. Case & Co., 54 Front and 56 Jersey avenue, Fort Jarvis, N. Y.; Central Garage and Machine Shop, Union street, Sparkhill, N. Y.; Industrial Engineering Co., 122 E. Lincoln street, Shamokin, Pa.; N. M. Stewart Co., 414 E. Market street, Aberdeen, Wash.; Bond Auto and Plumbing Co., Tennessee street, Florence, Ala.; Freeman & Aldred, Park place, Morristown, N. J.; Miller Auto Co., Vicksburg, Miss.;



New General Headquarters of the Bearings Service Co. at Cass and Willis avenues, in Heart of Detroit's Automobile Service Station.

The Reo Motor Car Co., Lansing, Mich., is producing 80 passenger cars and 60 motor trucks a day. The factory is working 24 hour shifts. The company is sending out announcements to its dealers advising them that price increase is forthcoming April 1, but no figures are stated.

The Ri-Chard Automobile Co., Cleveland, O., has put on the market the new model Ri-Chard car, showing its refinements for 1918. The car which bears the maker's name, M. Francois Richard, has many individual features and is distinguished by its luxurious fittings and the 100-horsepower engine.

The Oakland Motor Car Co., Pontiac, Mich., has advanced the price on all models in the 1918 line. The new prices went into effect March 1 and are as follows: Five-passenger touring car and three-passenger roadster, \$1135; roadster, \$1315; convertible sedan, \$1355; unit body sedan and unit body coupe, \$1650, and town car, \$1920.

The White Motor Co., Cleveland, O., shows profits of \$3,800,000 after all deductions, including reserves set aside for excess profit taxes, are made. This is equivalent to \$12 a share on the 320,000 shares of stock (par value \$50) outstanding, or three times the present rate of dividends. Dividends are being paid at the rate of \$4 per share annually. The company's balance sheet shows a strong treasury position, current assets amounting to nearly \$15,600,000, and current lia-

to be used by its plant, but owing to war orders the Studebaker corporation found that it needed the buildings and the deal with the Essex concern had to be cancelled.

The Baker R. & L. Co., Cleveland, O., has raised the price on its electric cars. The brougham type will be advanced \$150, which will bring this product up to \$3150, and the coach type will be advanced \$200, making the price \$3400.

The Vacuum Oil Co., New York, manufacturers of the well known automobile lubricating oils which are sold under the trade name of "Gargoyle Mobiloils," have issued the 1918 edition of their valuable reference booklet entitled, "Correct Lubrication."

This book is an exhaustive treatise on the subject of lubrication of the automobile, and also treats with the many details of car construction, the efficient operation of which depends upon proper lubrication at the many wearing points in engine and chassis.

All of the articles, many of which are illustrated, and the lubrication chart in the book are of a practical, helpful nature. Dealers, garage men and repair men will find much of interest in the book and many practical pointers to aid them in their business. People in the trade may obtain a copy of "Correct Lubrication" by applying to the company at its main offices, 61 Broadway, New York City.

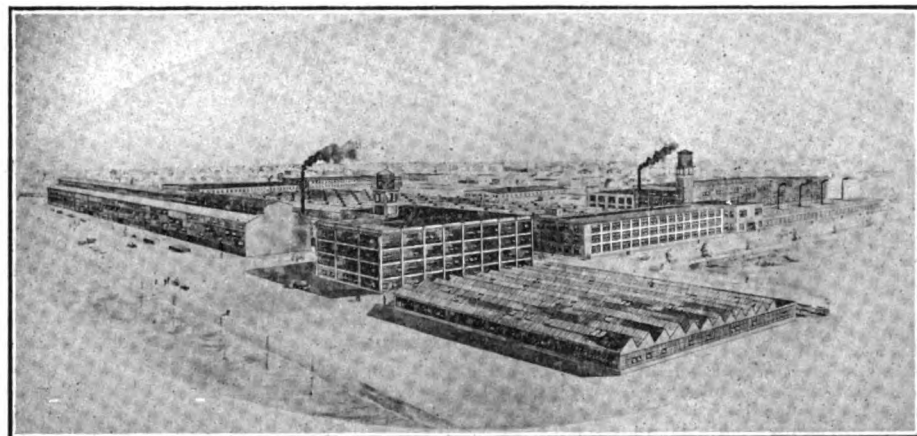
S. M. Hottenstein, Towanda, Pa.; the Battery and Auto Station, 1051 Broad street, Augusta, Ga.; G. W. Hawkins Auto Supply Co., 918 Rusk street, Houston, Tex.; Durham Buggy Co., Durham, N. C.; Auto and Gas Engine Works, Elizabeth City, N. C.; Sutton Motor Co., 135-137 Gillespie street, Fayetteville, N. C.; Guilford Motor Car Co., 105-7-9 S. Cavie street, Greenboro, N. C.; Auto Battery Co., 10 Havgett street, Raleigh, N. C.; Geo. T. Burnette, S. Wash-Rose and Main streets, Rocky Mount, N. C.; Spencer Motor Co., Spencer, N. C.; Washington Motor Car Co., Washington, S. C.; the Auto Repair Co., corner Third and Elm streets, Winston-Salem, N. C.; Missouri Valley Motor Co., Bismarck, N. D.; F. W. Turner, Willard and Second avenue, E., Dickinson, N. D.; B. B. Bennett, Drake, N. D.; Fargo Plumbing and Heating Co., 123 Broadway, Fargo, N. D.; Dakota Motor Sales Co., Minto, N. D.; Stice Hansen Motor Co., Williston, N. D.

The Velle Motors Corporation, Moline, Ill., has made several changes in its organization. Charles R. Gardner has been appointed assistant sales manager and will be located at the Velle factory. He was formerly manager of the Velle branch at Omaha. L. H. Hazard succeeds C. B. Rose, who has been commissioned a major in the United States Army. He has been appointed superintendent of production. G. E. Martin will take Mr. Hazard's place as chief engineer. F. D. Soper has been appointed purchasing agent and C. E. Mason traffic manager.

The Gerlinger & Co. of San Francisco, Cal., has been appointed as factory representatives of the Fruehauf Trailer Co. of Detroit. They will have charge of the states of Washington, Oregon, Idaho, Utah, Nevada, California and Arizona. Mr. E. E. Gerlinger is the president of the company, with which he has been associated for many years. The Frue-

hauf agency is one of the oldest established concerns in the trailer industry and manufactures a complete line of semi-trailers.

The Kissel Motor Car Co., Hartford, Wis., has appointed the following dealers as distributors of the KisselKars:



The Detroit Plant of the Continental Motors Corporation, the Largest Manufacturer of Internal Combustion Engines in the World.

Welch Garage, Inc., Welch, La.; Watson Automobile Co., Sioux City, Ia.; J. M. Yeager, Yeagertown, Pa.; S. C. Blackmon, Monroe, La.; Elyria Auto Service Co., Elyria, O.; A. G. Perry, Sanford, N. C.; John E. Sadler, Anderson, S. C.

The Stanley Motor Carriage Co. of Newton, Mass., has declared its regular quarterly preferred stock dividend of 1%, payable April 1 to stockholders of record March 20.

The Howard Automobile Co., 250 Boulevard, New Haven, Conn.; The Electrical Construction Co., Racine, Wis.; The Millen Motor Sales Co., Millen, Ga., and the Northern Garage Co., Northern avenue, Avondale, Cincinnati, O., have been appointed dealers for the Stanley steam car in their respective territories.

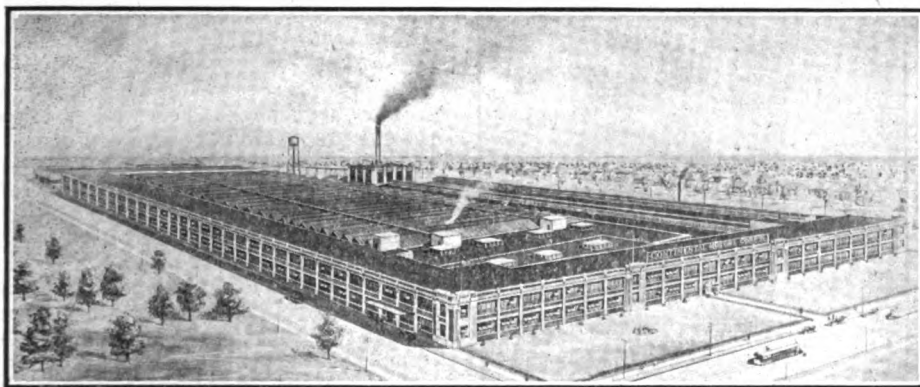
storage batteries and all parts for Apeldo batteries can be obtained from the H. B. Shontz Co.

The Continental Motors Corporation, with executive offices at Detroit and plants at Detroit and Muskegon, Mich., claims the distinction of being the largest

exclusive manufacturer of engines for automobile trucks and cars in the world. The progression of the company is remarkable in many ways. It was established in 1902 at Muskegon, where business was carried on for several years, the demand for the engines necessitating constant expansion of the plant.

Later on the need of representation in Detroit justified the location of the sales department in that city, and then came the construction of another factory in Detroit. Since then the growth of the company has been extremely rapid. The company has 1,000,000 square feet of land in its factory sites, and on these are splendid manufacturing buildings, constructed with regard for every essential to progressive industry and the welfare of the workers. The equipment of the plants is the best obtainable, with reference to economies of time and labor and every facility for expediting production has been provided. Statement is made that during the past two years the area of the factories has been increased 100 per cent., which is the best demonstration of the development of the company.

The company builds nothing but four and six-cylinder engines, these being designed for both car and truck service, producing these in very large numbers. Besides its regular contracts the company is now producing a considerable proportion of the parts necessary for the construction of the trucks contracted for the service of the United States army. The capital invested is \$18,000,000. The officers of the company are: President, B. F. Tobin; vice presidents, H. J. Warner and R. W. Judson; treasurer, A. H. Zimmerman; secretary, W. E. Angell; sales manager, J. G. Painter. The accompanying illustrations demonstrate more clearly than description the magnitude of the plants and the operations of the concerns. Incidentally, both of these factories are operated at top speed to maintain the desired production.



Extensive Plant of the Continental Motors Corporation at Muskegon, Mich.

hauf agency is one of the oldest established concerns in the trailer industry and manufactures a complete line of semi-trailers.

The Automobile Crankshaft Corporation of Detroit shipped to the Waukesha Motor Co., Waukesha, Wis., a car load of crankshafts, consisting of 600 shafts, all ground, drilled and polished. The average weight of each crankshaft is 80 pounds. Ordinarily crankshafts are

The H. B. Shontz Co., distributors and central service station for U. S. L. batteries, 157 West 54th street, New York City, has purchased the entire battery stock and equipment of the Spltdorf Electrical Co., who have been manufacturing the well known Apeldo storage batteries for automobiles and motor boats for ignition, lighting and starting purposes. The Spltdorf Electrical Co. will discontinue the manufacturing of

Furs Fashionable For the Spring Season

By MRS. A. SHERMAN HITCHCOCK.

Fashion by sponsoring fur as strongly as she has, now makes the garment of fur a necessity during the Spring and Summer months, and this coming year will find almost every woman wearing some kind of a fur garment. This is an entirely new model of taupe wolf, and even though furs may have seemed a little eccentric for warm weather wear at one time, they are entirely a matter of fact now and we must admit we like 'em, too.
(Courtesy Wm. Jackman's Sons, New York City.)

BALMY days, blue skies and budding foliage, which come to us in April, bring to us the motoring enthusiasm which is quite irresistible in the spring time. Loving the out-of-doors, ever welcoming the changes of scene, and impatient with the chill and bluster that appears to be unusually tantalizing, the motor lovers now may be found driving over country highways in large numbers. Soon spring in its full glory will have arrived and the sport of motoring will present its fullest attractions to the seekers for sunshine and exhilarating blossom-scented air. Spring this year has shown an inclination to linger long in the lap of winter, and, like a bashful child, seems to hesitate upon the threshold as if loath to enter, but harbingers of the loveliest season of the year are now to be seen everywhere.

As spring in nature means a return of beauty and promise, so fashion in spring brings forth fresh inspiration to the jaded mind and heart of womanhood. Perhaps our designers and manufacturers have gazed into the crystal and seen reflected there the dawn of an approaching peace, or perhaps it is that they have caught the spirit of cheerfulness that always comes with the first signs of spring, when nature doffs the sombre garb of winter and blossoms forth in the fresh and lovely tints of a new-born season. But whatever the reason we have never had smarter, more practical or attractive garments for the motoring sport and never a more varied offering. The psychological effect of clothing, not only on women themselves but upon our men in khaki and blue, is a subject which has received much consideration from deep thinkers all over the country. It is conceded that when the feminine contingency make the trip to camp they should be as smartly and cheerfully clad as possible, and it is said not only to be the

desire of the women in question, but also the desire of their men folk. Color, for instance, means so much more nowadays than ever before. It means cheer; it means an uplift from the drab surroundings of our boys; it indicates brightness and hope, not only for them, but for the women themselves, and certainly it is the duty of every brave American woman to preach the gospel of good cheer with every means within her power. There is absolutely nothing which so clearly expresses any woman as her clothes. The eternal feminine never dies, and while exigencies of war have necessarily brought about a certain conservatism in dress and a lessening of display and extravagance, women's interest in clothes is really as great and their appearance quite as chic as in other seasons, when war existed only in the imagination and days were not devoted to much relief



Very new and modish is this side draped stole cape of navy blue men's wear serge. It is lined with coin dot silk in self color and has a trimming of silk braid. Nothing more practical than the cape has been worn by the motorist.
(Courtesy Franklin Simon & Co., New York City.)



The custom of putting fur garments away in April and bringing them forth in November is a custom that belongs to the long ago. The furriers are bringing out new designs now for wear during the cool days in summer. Here is one of the very newest models in coatees, made of Hudson Seal and Chinchilla Squirrel. Never has there been a summer when furs have been in evidence as they will be during the coming one.
(Courtesy Wm. Jackman's Sons, New York City.)

work of various kinds.

One of the newest garments for motoring and destined for favor, without doubt, is the cape. Perhaps it is the military tendency of everything that is helping to make this garment popular, but even though everything military were not psychological, these garments would be most excellent for the motorist because of their wonderful ability to serve for all occasions and their extremely modish lines. Ripply and graceful is the cape of men's wear serge illustrated. The full length side stole reaches from the smart rounded crushed monk collar and forms a crushed belt to which side draped cape is fastened, thus giving a decidedly graceful arm opening. Another smart cape for motoring is made of Russian green Worumbo Kashmir, with silk piped buttonholes in gold color. It drops to quite the bottom of the skirt and while a sash of gold colored satin confines the front fullness the back is entirely free to swing into graceful godets. A cape of taupe Hillendale has its side and front section so fastened that by means of buttons and button holes tight sleeves with simulated cuffs

may be introduced. A military collar, trimmed with braid, is on this model. There are inserted pockets, which are concealed by an upstanding lap tuck, which defines the shapeliness of the cut of this section. Blue Poilu Worumbo is used for a full length cape made with little capelettes over the shoulders and having a large shawl collar, almost cape-like in its style. The leading materials for capes are the Worumbos, which include Camel's Hair, Poilu, Hilendale, Kashmir and Nanken. These materials are wonderfully protective and give entire satisfaction in their wearing qualities and mark the garment as one of beauty and exclusiveness. Various names are given to cape models, among them being "The Cape of Happiness," the "Liberty" and the "Madonna." The "Cape of Happiness" is but a shoulder cape in front, buttoning straight up to the chin with bone buttons. In the back it is full length, falling in graceful folds that reveal the lining. It is particularly good developed in serge and having a gay silk lining. The "Liberty" cape derives its name from the lining, which symbolizes the Tricolor of France and America, for a very deep border of white and red finishes a navy blue satin lining. It is military in other respects also, having a group of three self straps fastening across the chest below the standing band collar piped with red. The "Madonna" cape is like a draped wrap with an end thrown over one shoulder. It has an open armlet to admit the right arm, but at the other side there is nothing but a long end for draping. This



This is one of the smartest of new Spring coats for the motor woman. Made in the new three-quarter length of fabric knitted polo cloth, in Yankee, rose, Copenhagen, green and blue. It is silk lined and has bone buttons.
(Courtesy Franklin Simon & Co., New York City.)

lends itself to much effective work according to the skill of the wearer.

A delightfully soft, cozy-looking motor coat is made of Nanken in a soft, woody brown shade. It has a good deal of shirring on the hips and two large pockets with odd shaped flaps. The shoulder is not ordinary and is a pointed prolongation of the sleeve. All the better grades of motor coats for spring wear are made of very soft woolen stuffs with the Worumbo materials very far in the lead. The motor woman buying coat material should be very careful in her selection of wool materials this year and absolutely insist upon a thoroughly reliable make of goods, otherwise she is quite apt to heartily regret her expenditure.

The new coat silhouette will be straight, with long shoulders and narrow sleeves. It is called the "fatiguante" silhouette by the French. A novel feature of spring motor coats is a wide scarf with self-fringe coming from the right hand shoulder seam, loosely draped across the bust, and flung over the left shoulder, the end being weighted with a handsome tassel to keep scarf in place.

Every motor woman is particularly impressed this year with the smartness and simplicity of the new hats. There is really nothing smarter than simplicity in millinery, but it must be of the right kind. The two models illustrated are leaders in the fashion world and repre-

sent the most charming and exclusive line of millinery in the country. These particular models are especially appropriate for the smart motor woman and cannot be excelled. Each and every woman fully realizes the supreme satisfaction of wearing a hat that is becoming to her own individuality. There is absolutely nothing in the entire wardrobe which is so important as the hat, for it is entirely due to its becomingness whether a woman is looking her best or otherwise. Gage hats seem to be built with just the exact understanding of a woman's requirements and the materials used are of great excellence, so that the hat retains its correct shape and charming appearance even after much hard wear. They are always to be strongly recommended to the motorist. There are some very chic Gage turbans for motoring in the new artillery red straw and also in marine blue, which will greatly please the motor woman. Use of sipper straw is offering considerable opportunity for the designers to create new ideas. Some of the crushed irregular crowns in the Gage models are achieved by the use of this straw. A high finish is given the above mentioned vivid colorings and is very smart. A Gage model named the "Evangeline" is a stunning turban in a tam effect, with chenille hemp crown and three end Jap brim. It is trimmed with band and bow



Isn't this a stunning model for motor wear? Exclusive and ultra-smart, fitting the head snugly and being vastly becoming, it cannot be excelled for this season's wear. Made of straw and satin and with an unusually exclusive buckle trimming, this hat is appropriate for wear any time and anywhere.

(Courtesy Gage Brothers & Co., New York City.)

of grosgrain ribbon. The "Eudora" is another excellent model for motoring. It is a saucy little brimmed mushroom of Visca braid and its only trimming is small bows of grosgrain ribbon. Still another of the Gage models is the "Gertrude" and is one of the very new narrow brimmed and high crowned sailors. It is made of sand Georgette crepe, with navy piping straw facing. The crepe is draped around the side crown and finished off with a narrow grosgrain ribbon. There are small embroidered ornaments on top of the brim.



For the motorist who uses her car for all sorts of social occasions—as nearly all motorists do nowadays—this smart hat is ideal. Made of straw with satin facing and trimmed only with its chic burnt goose, it is a model that will strongly appeal to every woman of good taste.
(Courtesy Gage Brothers & Co., Chicago, Ill.)

Buick Model

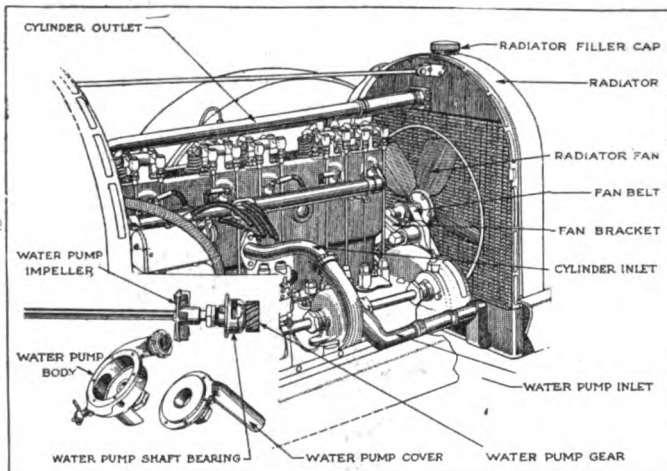
D-6-45 Known As "Little Six"

The 19th series of articles dealing with the overhaul of used cars. It is the purpose of these discussions to show that a used car has extensive service value, which can be greatly increased with but a slight outlay and the replacement of worn parts. The 20th article of this series will appear in the April 25th issue of the Automobile Journal.

Overhauling The Automobile

THIS article deals with the overhauling of the Buick model "D-6-45," known as the "Little Six," but is also applicable for instructions as to general repair work on models "D-6-44," "D-6-47," as these are all practically the same in mechanical detail.

The purpose of this discussion is to consider the wear that occurs in the various parts of the engine and drive units and to suggest means that will assist the amateur to locate and remedy the troubles that may exist.



View of the Pump Driven Cooling System.

After draining the water from the cooling system loosen the hose connections at the top and bottom of the radiator. The brace rod that holds the radiator rigid to the dash is unbolted and the rod turned out and then the bolts holding the radiator to the chassis are taken out after which the radiator is taken off and laid flat upon the work bench. A careful examination should be made for leaks which should be soldered. Plug the inlet and outlet holes of the radiator with blocks whittled from wood and mix a solution of hot water and washing powder which is poured into the radiator and allowed to stand for 10 minutes after which the liquid is poured off and clear boiling water run through, repeating the process several times and finally flushing with cold water to thoroughly clean the interior portion of the radiator.

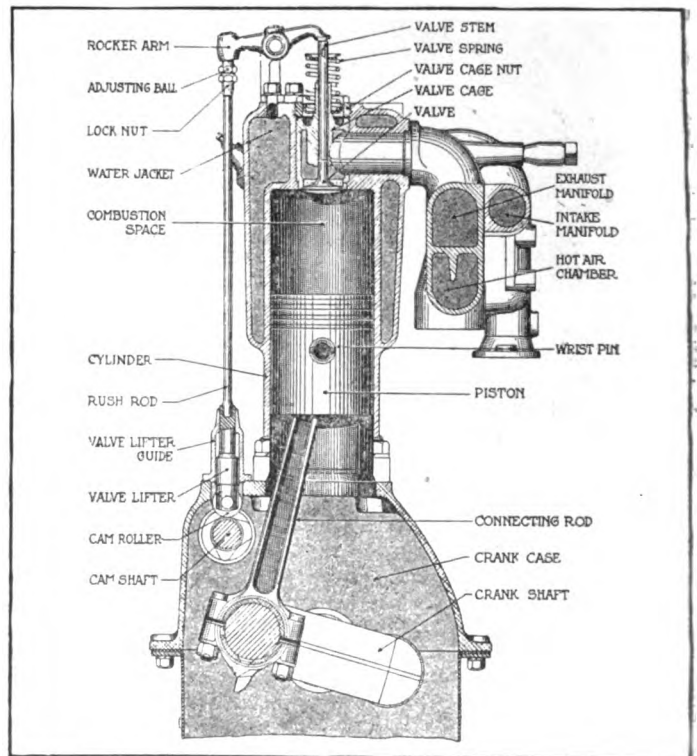
The water manifold is next removed and all wires and cable connections taken off or tied back on the dash out of the way. These should be properly tagged to assure accurate replacement in original places.

The Stewart vacuum tank is next removed by uncoupling the vent tube, the suction tube to the intake manifold, and lastly, the gasoline line connection leading back to the gasoline tank. This assembly should be laid aside, care being taken not to bend or otherwise injure the copper tubing by accidental contact. The fan is supported by a swinging arm held by a bolt and the tension proportioned by an adjusting nut. Release of this nut allows the fan to become loose and removal of the bolt permits it to be taken from the engine. To remove generator take out the bolts at the base of the generator and those at the rear, which clamp down the cover

of the starter gear case. Drive out the pin at the front of the generator shaft and the generator upon which the coil is secured may be removed. The intake and exhaust manifold, together with the carburetor assembly, is clamped to the engine by three arms, each containing two bolts. Removal of the heating tube and the six arm bolts will permit the removal of these parts.

Remove the oil inlet pipe from the dash to the left hand side of the motor and disconnect all dash apparatus from the engine. Unbolt the foot pedals and slip them off. Remove the gear shift and emergency brake and uncouple the universal joint. When the bolts that hold the engine to the chassis are removed the engine and transmission unit will be stripped clean, ready to be swung clear of the frame. The engine is supported on the frame at three points. Pass a chain about the cylinder block and with a hoist carefully lift from the frame, after which the engine can be lowered to a wooden frame made to fit it with an eye towards making each point easily accessible.

The engine has six cylinders, cast en bloc. The valves of the overhead type are opened and closed at proper intervals by the rocker arms and push rods, controlled by the cam shaft, which is geared to the crank shaft running at one-half the crankshaft speed. At the rear of this shaft is another gear, which rotating drives the oil pump located in the lower half of the crank case. The pump shaft revolves at one and one-half times the speed of the crankshaft. This shaft also drives the Delco generator.



Sectional View of Valve and Piston Assembly.

The first operation in the overhauling is in grinding the valves. One should start by compressing the valve spring, thus allowing the push rod to become loose, whereupon it may be lifted out. The valve cage nut is next loosened with the Buick special drift wrench supplied in the tool kit. A light tap from a hammer will suffice to loosen the cage so that it may be withdrawn, care being taken not to injure the bronze packing ring on the top of the valve cage. Clean the valve spring and other parts with kerosene, then smear a grinding compound of fine emery flour mixed with a little oil upon the valve and its seat. Grind the valve by turning the valve back and forth with a valve grinding tool. A thoroughly finished job will show a bright ring about 1/32 of an inch wide about the valve seat that is free from all spots and blemishes. Extreme care should be taken in cleaning

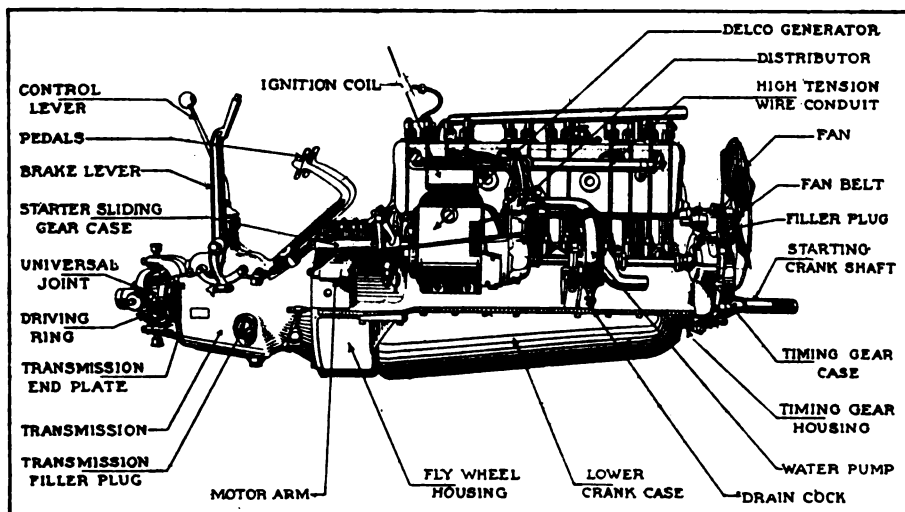
being adjusted at that time. When adjustments are completed tighten as before.

The piston rings are seldom broken, but should fractured rings be found they can easily be replaced by disconnecting the connecting rod caps and sliding the pistons and rods down from above, slipping past the crankshaft when it is turned to the right position. The rings may be slipped on or off the piston by sliding a thin sheet of metal underneath them to prevent their dropping into the grooves until they are in their original positions. It will be noted that the piston pin bearings are offset from the centre and that a small arrow inside the piston edge points towards the offset. When assembling be sure that the connecting rod with the arrow points towards the flat side of the oil dipper. This will bring the piston pin bearing closer to the camshaft side of the engine and on the compression stroke and gas pressure over-balances the piston so that it does not slap under the force of explosion. Practically all the adjustments on the oil pump can be made by the removal of its cover in the lower half of the engine block. This assembly should only need inspection, but should repairs be necessary the pump should be removed and taken to a Buick repair station.

The disc clutch assembly consists of a series of steel plates faced with an asbestos friction material, which are connected alternately to the flywheel or to the clutch shaft of the transmission. Removal of the clutch cover will permit inspection and adjustment of these parts. After washing thoroughly in gasoline the adjustments should be made by moving the lock washer and taking up on the adjusting nut

on the clutch release to allow more clearance between the clutch release bearing and the plates. When this is properly adjusted there should be 1/32 inch clearance between the ball thrust bearing and the rear plate against which it operates. See that the pins on which the discs slide are lubricated lightly.

In taking down the transmission the gear teeth should be carefully examined and if the gears have begun to shear off or burr at the edges they should be removed and the corners ground so as to eliminate friction as much as possible and be able to engage the other members with the least noise. These gears should be tested to see that they are firmly fixed to the shafts and all bolts, keys and pins are firm in their proper places. Looseness at these points not only causes noisy operation, but may result in a shearing off of the fastening from the constant hammering action of the loose members. The gear case should be emptied and washed out with gasoline or kerosene and thoroughly examined to



Right Side of Power Plant Completely Assembled.

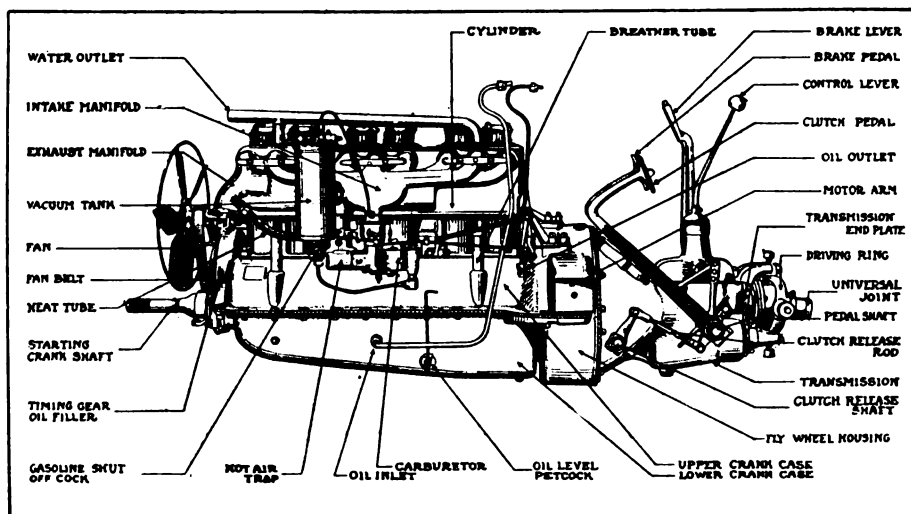
away all traces of the grinding compound before the valve is replaced.

The carbon deposits in the compression chambers may be burned out with an oxy-acetylene torch, or it can be scraped off with a bent scraper through the valve cage holes. See that none of the carbon dust gets into the valves or cages.

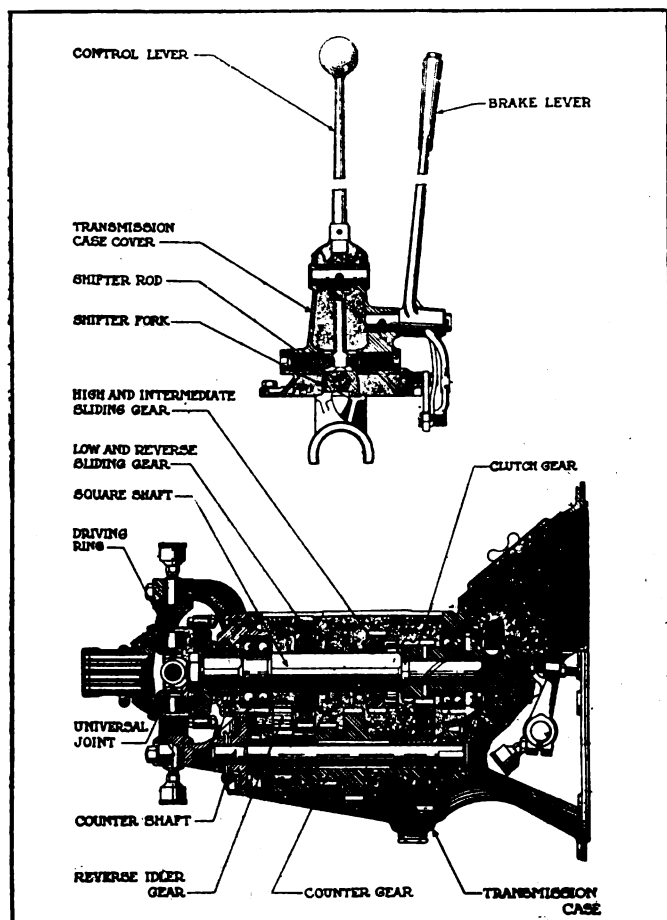
Remove the plug from the lower parts of the crank case and drain the oil into a bucket, where it can be strained and laid aside for future use. Remove all bolts retaining the crank case to the block. Then the case will drop away, bringing with it the gasket.

All foreign matter should be carefully scraped from the gasket and the crank case cleaned with a stiff brush and kerosene. The extent to which it will be necessary to go in overhauling the engine will depend upon the examination of the connecting rods and pistons, and if the pistons and cylinders are in bad condition the block may be removed at this time.

The connecting rods may be tested for play by attaching the starting crank and having someone move it back and forth while listening at the base of the block for any sounds that would indicate loose fastenings or worn bearings. The cylinders will act as a sounding chamber for this operation. If a loose connecting rod is detected it can be taken up by removing the cap and taking out one or more of the metal shims. Note that the bearings are bright and show no indication of a lack of lubrication. The bearings should not be adjusted so tightly that they will not permit the piston to fly back when it is brought up against compression with the compression good. When the first bearing is tightened properly, loosen again and adjust the second bearing and so on until each one is finished, each bearing being loose except the one



Left Side: Engine, Clutch and Transmission in Unit.



View of Transmission and Control Assembly.

note that metallic substances do not adhere between the balls of the races. The shift yokes and collars demand attention and if any play exists the defective parts should be replaced to fit with a minimum of lost motion.

If repairs to the generator and coil assembly are necessary, which is not likely, this assembly should be taken to a shop repairing this sort of work.

When the engine is reassembled in the chassis retard the spark lever to its lowest position and turn the engine one inch past dead centre with No. 1 cylinder on the firing stroke. Loosen the timing adjustment screw in the centre of the distributor shaft and turn the breaker cam so that the rotor button will be in the position under No. 1 high tension terminal when the distributor head is squarely located. This determines the proper lobe of the cam to time. The cam should be very carefully located so that when the slack in the distributor gears is rocked forward the contacts will be opened by the cam and when the slack is rocked backwards the contacts will just close. Tighten all adjustments and replace the rotor and distributor head properly, locating the tongue in the hold-down clip. The cylinders fire in the following order, 1-4-2-6-3-5.

The Buick manufacturers use the Marvel carburetor and in this type the opening between the mixing chamber and the intake manifold is controlled by the butterfly valve that connects with the throttle on the steering wheel, thus determining the amount of gas being fed to the engine. In the upper part of the mixing chamber and venturi tube are surrounding jackets in which some of the hot exhaust gases passing keep the instrument warm, assisting vaporization of the gasoline.

The damper in the jacket opening is connected to and controls the amount of gasoline being fed to the engine. When reassembling the carburetor be careful not to use too much force on the nuts as the threads are easily stripped. In handling delicate machinery such as this instrument carelessness will result in the purchase of new parts. Tighten the needle valve by turning to the right until it is completely closed. Turn the adjusting screw of the air valve until the end of the screw is opposite the point of the ratchet spring just above it. Open the gasoline adjustment by turning the needle valve once all the way around. Start the engine, letting it run a few minutes with the air regulator on the dash turned to "hot" until the engine is thoroughly warmed. Retard the spark lever and turn the gasoline adjustment to the right, thus closing the needle valve until the engine idles smoothly. Advance the spark lever, turning the screw adjustment to the left a little at a time, until the engine begins to skip and pop and slow down. When this point is reached turn adjustment to the left until the engine runs evenly. The adjustment can be tested by opening the throttle wide for an instant and then closing. If the engine takes the acceleration the adjustment is complete, but if it pops and skips the adjustment should be slightly turned to the right.

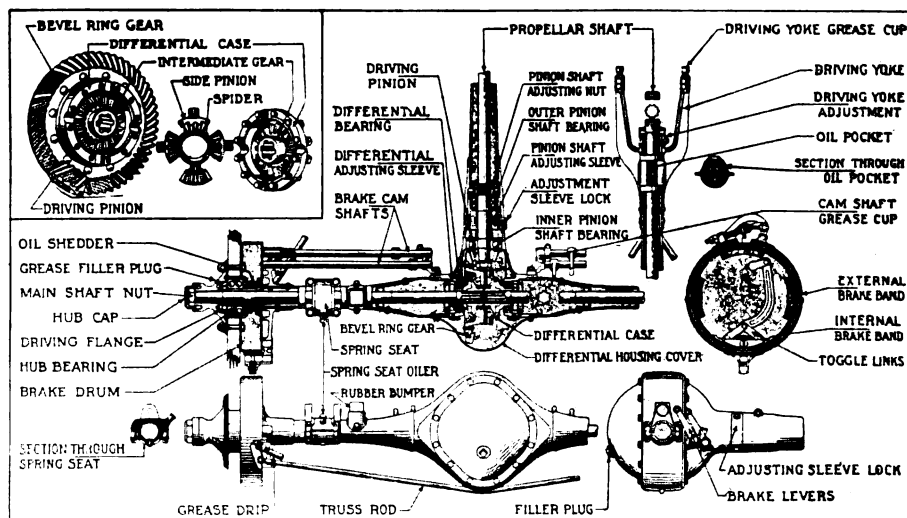
The water pump is of the centrifugal type and is constructed of an impeller with curved blades that is fastened to the shaft, a loose fitting, air tight casting with inlet and outlet connection is fastened to the engine crank case. The impeller revolves, sucking water from the radiator to the centre of the impeller and centrifugal force, throws it off at the outer ends of the blades and out of the casing into the cylinder jackets.

To keep the casing tight the pump shaft is held in glands, filled with a prepared wick packing that acts also as a lubricant. These glands must be tightened from time to time as they show indications of leakage. Care should be taken to not get them so tight as to bind the shafting. The bearings of the water pump are provided with stuffing nuts to keep them air tight. These should be repacked with graphite wicking when they start to leak.

The rear axle is of the three-quarter floating type and may be entirely taken down without removing the housing from the car. The rear of the car should be jacked up and set upon horses. The six nuts holding the wheel are then removed and the wheel taken off by using a wheel puller.

The driving flanges are keyed to the ends of the axle shafts and bolted to the wheel hubs, which run on double row ball bearings mounted on the outer ends of the axle tubes. The weight of the car is carried by the housing and the axles only transmit the driving effort. These hub bearings are lubricated with cup grease injected through a filler plug hole in each hub. The hubs are also provided with felt washers and oil deflectors that serve to throw off any oil that might work out of the differential, preventing it from getting into

(Continued on Page 47.)



Disassembled View of the Rear Axle.

New Funeral Car Accommodates 38 People

**Mammoth Vehicle Now Being Used in
Several Cities. Does Away with
Funeral Cortege.**

The funeral procession, an institution as venerable almost as time itself, may soon become passe, succumbing to the march of progress with its many innovations and changes in customs. In olden times the funeral cortege was made up of casket bearers, relatives of the deceased and mourners wending their way toward the last resting place on foot. With the advent of horse drawn vehicles the funeral procession was made up of a hearse and carriages, which form of cortege has been the custom for several centuries and is still the accepted form in the majority of cities, although the automobile cortege has gained great popularity in the past few years.

Now comes the funeral car, a mammoth vehicle, which carries not only the casket, flowers, undertaker and his staff, but the entire funeral party, and threatens to do away with the old form of procession. It is already in use in several cities and has many advantageous features, as it not only lowers the cost of funerals, but is far more convenient than the old system, as it moves through the city traffic to its destination with no delay and without the waiting necessitated at burial ceremonies caused by the delayed arrival of the various units of the procession.

The funeral car as it is called and which is shown in an accompanying cut, holds 38 people comfortably. It is mounted on a three-ton chassis and has a length over all of 22 feet, 10 inches. The outside width is 99½ inches and inside there is a clear width of 74 inches. The six doors and driver's door on each side have drop windows. The two doors on each side of the casket compartment have stationary windows. The rear windows are stationary and all windows of the body have silk drop curtains.

Above the doors are transoms of Florentine glass, every other one hinged. There are three electric lights on the ceiling of the body and two telephones connecting with the driver's seat. The casket compartment has a shelf 22½ inches from the floor, and fitted with rollers and stop pins. The upholstery throughout the car is Fabrikoid. The cars are usually finished in either black or gray. A step running the length of the body folds up when not in use.

**S. W. WYMAN DISTRICT MANAGER
FOR I. H. C. MOTOR TRUCKS.**

In 1916 the International Harvester Co. doubled its motor truck sales. Last year it enlarged the factory and doubled this business again.

On March 16, 1918, sales of International motor trucks had already passed

the total 1917 dollar and cents mark and left it far behind.

It is in line with this active development of sales policy that the company has recently created another district managership and selected for the position S. W. Wyman. Mr. Wyman has been appointed International motor truck district manager of sales, with supervision over the whole territory of the United States west of the Mississippi.

Wyman is an I. H. C. man with a long record and at the same time he is a direct product of the present International motor truck and its immediate and remote ancestors. Mr. Wyman has been with the Harvester company 10 years and the first thing that he ever sold for the company was a motor truck.

Wyman was living in Auburn, N. Y., 10 years ago when he first saw a picture of the International motor truck of the year 1907. It was this picture which decided Wyman that he wanted to work for the Harvester company. He got the job and

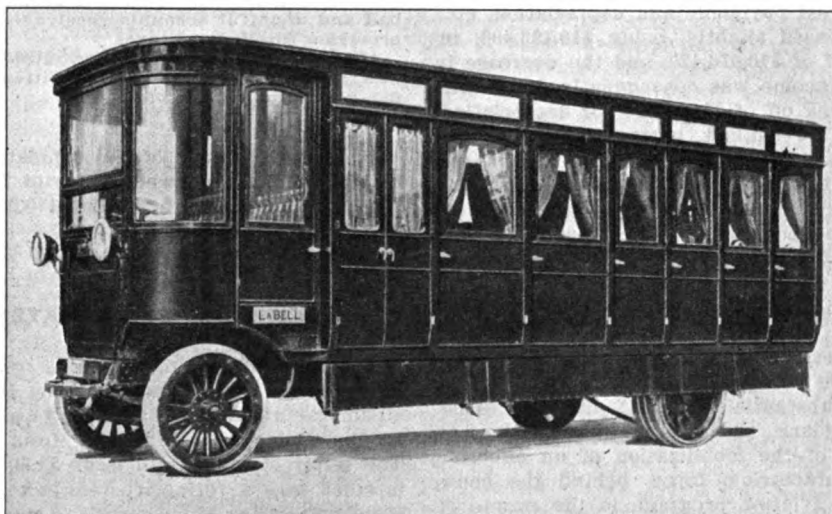
Light Exports of the Industry's Products

**February Shipments of Cars, Trucks and
Parts to Foreign Countries
Lightest Since 1915.**

The exports of automobiles, trucks and parts during February were valued at \$6,958,808, or 41 per cent. less than the January exports and about 10 per cent. less than for the same month in 1917. The shipments were smaller in value than in any month since February, 1915.

Passenger car shipments were 674 less than the exports in January and the value decreased more than \$700,000. Truck shipments decreased from 1156 in January to 765 in February, and the value decreased 45 per cent.

The fact that British South Africa,



**The New Funeral Car Which Carries Casket and Has Accommodations for
38 People. Mounted on Three-Ton Chassis.**

started out selling the trucks with nothing but pictures and specifications to sell from. He sold to men most of whom had not only not seen the Harvester company's truck, but who had not even seen a motor truck of any kind. Wyman bears the unique distinction of having sold 15 of the 13 trucks sold in Auburn during the first year of his connection with the company. That is, he sold 15 on his territory, but even in that early day motor truck companies were worried by deliveries and the company found it impossible to send more than 13 trucks to Auburn. Wyman said it hurt him all the way through to give those two men back their money. Five years later (five years ago!) Wyman sold 101 motor trucks in one year.

His boss, O. H. Browning, says there is only one way to explain Wyman's success, and that is that he has always hit the work trail and hit it hard. He has used his head to the limit and worked to beat the band. That's why the Harvester company felt justified in slicing off more than half of the United States and handing it over to him. S. W. Wyman has a most delightful and enjoyable personality.

Australia and New Zealand bought but a small percentage of their usual purchases was largely responsible for the sharp decline in passenger car exports. In January the shipments of passenger cars to Australia totaled 931, as compared with 144 in February. New Zealand took 110 cars in February, as compared with 221 in January. British South Africa took 231 cars in January and 31 in February. Canada, however, took 919 cars in February, as compared with 692 in January.

The Allies took only a few trucks last month. France received 86 from this country, as compared with 662 the month before, while none were shipped to the United Kingdom. Canada bought a total of 420 more than all the other countries.

Only two cars were imported into this country during the month, making a total of 35 since last June.

**WILT ENGINEERING PLANT
SOLD TO JOHN G. DODGE.**

John G. Dodge of Dodge Brothers has purchased the plant of the Wilt Engineering Co., Detroit, Mich. He is reported to have paid \$115,000 for the property.

Willys-Overland Earnings Shows Decrease

The Actual Net Income Over \$3,000,000
Under Figures for
1916.

The report of the Willys-Overland Co. and its subsidiaries for the calendar year 1917 shows a net income, after all deductions, including reserve for taxes, of \$6,121,544, equivalent to \$3.16 a share on the common stock, after payment of regular preferred stock dividends. In 1916 the company earned \$9,565,718, equivalent to \$5.71 a share on the common stock then outstanding. The decrease in actual earnings amounted to \$3,444,174.

The net earnings of the company and its subsidiaries, after ordinary deductions and reserve for taxes, aside from interest payments and depreciation, etc., increased slightly, being \$10,193,490, instead of \$10,016,420, and the decrease in net income was consequently due to the writing off of \$1,330,798 for depreciation, \$559,940 against parts of discontinued models, increase in interest charges, etc. As the dividends paid on the common stock exceeded the actual earnings after these deductions, the company drew on its surplus to the extent of \$2,318,026, and this, with other expenses charged against the surplus, decreased the latter from \$27,596,593 to \$24,301,384.

President Willys in his report discusses the purchase by the company of "a substantial interest" in the Curtiss Aeroplane and Motors Corporation, as part of the mobilization of an effective manufacturing force behind the country's aviation program, in the course of "a rapid and sweeping readjustment from a peace to a war manufacturing basis."

"Orders of this company to date for airplane motors and parts amount to in excess of \$12,000,000, and further heavy orders are assured," says the report. "An important ordnance contract has been undertaken amounting to over \$15,000,000. Negotiations have been completed for a large munitions contract, for the execution of which the company's machine shops are admirably fitted. The company is thus prepared to counteract any probable curtailment of passenger car production. The net earnings for 1917 received no benefit from the war work program, but on the contrary were adversely affected through the second half year."

In the report is found an explanation of the recent reduction in the common dividend rate from \$3 to \$1 a year.

Last week the company put into effect a new price schedule on its passenger cars. Model 90, the big seller in the Overland line, has been advanced in price from \$835 to \$909, or about nine per cent. The new prices on the other models is in about the same proportion.

Income account of the Willys-Overland Co. and subsidiaries for year ended Dec. 31, 1917, compares as follows:

	1917	1916
Net earnings....	\$10,193,490	\$10,016,420
Depreciation....	1,230,798	.....
Tool replacements	1,030,000	.....
Written off.....	559,940	.....
Contingency reserve	.....	.....
Interest.....	1,151,208	450,702
Balance.....	\$6,121,543	\$9,565,718
Pfd. dividends....	1,138,341	394,705
Pfd. stk. redempt.	.....	.....
reserve.....	450,000	.....
Com. dividends....	4,885,237	2,503,249
Com. stk. div....	1,965,991	1,155,690
Deficit.....	\$2,318,026	\$4,912,074
Premiums.....	.....	7,963,970
Prev. surplus....	27,596,594	14,720,549
Total surplus....	\$25,278,568	\$27,596,593
Written off.....	74,243	.....
Develop expense.†	902,941	.....
P. & L. surplus	\$24,301,384	\$27,596,593

*Parts of discontinued models written off.

†Good will of subsidiary company purchased and written off.

**Net earnings and income of all companies for the year after deducting repairs and maintenance of the properties, bad and doubtful accounts receivable and provision for Federal taxes.

†Development expense attributable to new work for 1918 delivery written off, per resolution of directors.

‡Surplus.

The balance sheet of the company as of Dec. 31, 1917, showed assets of \$113,292,701, as compared with \$103,110,006 in 1916 and \$58,908,803 in 1915.

GENERAL ENGINEERING CO. SELLS DOBLE STEAM PATENTS.

The General Engineering Co., owners of the Doble patents covering the Doble steam car and truck, has sold its assets to the Doble-Detroit Steam Motor Co. The latter company will issue \$1,500,000 of stock to five voting trustees, who will issue one voting trust certificate for the same amount to the General Engineering Co. Two of the voting trustees will represent the General Engineering Co. and three will represent the Doble-Detroit Steam Motor Co. The former company will in time be dissolved and no royalties are to be paid by the Doble company on patents or for licenses.

The new directors of the company are: Frank B. Alexander, who has been elected vice president, and William J. C. Johnson. Other directors will be elected until the directorate has 15 members.

PRESTON PASSENGER CAR WILL BE MADE IN SOUTH.

The Preston Motor Car Co., Birmingham, Ala., a newly organized concern, will manufacture a light passenger car and a truck of 1500 pounds capacity. A seven-acre tract, formerly the property of the Birmingham Boiler Works, has been acquired and when the company starts operations between 400 and 500 mechanics will be employed. The offices of the company are at 1015 40th street. Parts for the first car are being manufactured by the Sandusky Forging Co., Sandusky, O. The car was designed by W. K. Trapley of Newark, N. J. It will sell for \$600 and the truck at \$1000.

Annual Meeting of United States Rubber Co.

Directorate Enlarged and J. N. Gunn,
President of U. S. Tire Co.,
Was Elected a Member.

The annual meeting of the stockholders of the United States Rubber Co. was held at New Brunswick, N. J., and the proposed amendments to the by-laws were adopted and the number of directors was fixed at 24. All members of the present board of 21 were renominated, consisting of the following: James S. Alexander, New York; Walter S. Ballou, Providence; James C. Brady, New York; Nicholas F. Brady, New York; Middleton S. Burrill, New York; Samuel P. Colt, Providence; Harry E. Converse, Boston; Edgar B. Davis, Brockton; James Deshler, New Brunswick; James B. Ford, New York; Francis L. Hine, New York; Henry L. Hotchkiss, New Haven; William S. Kies, New York; Lester Leland, Boston; Samuel M. Nicholson, Providence; Raymond B. Price, New York; Homer E. Sawyer, New York; Charles Seger, New York; William H. Truesdale, Greenwich, Conn.; Theodore N. Vail, Boston; Ellisha S. Williams, New York.

Three new members were added: James N. Gunn, Ernest Hopkinson and Nathaniel Myers.

Nathaniel Myers, who has been the chief resident counsel of the United States Rubber Co. for the past 10 years, and as such most intimately associated with the affairs of the company, was elected a director.

Ernest Hopkinson, who has been closely associated with the United States Rubber Co. since the acquisition of the Rubber Goods Manufacturing Co. in 1915, was also elected a director. Mr. Hopkinson was a director and vice president of the Rubber Goods Co. when the United States Rubber Co. acquired that company, his specialty being the tire art, to which he has given almost exclusive attention for the past 20 years, both from the standpoint of a patent lawyer and expert, as well as the practical end.

J. Newton Gunn, now president of the United States Tire Co. and as such in charge of the commercial end of the tire division of the United States Rubber Co. and under whose management the tire business has grown rapidly, was also elected a director.

At a reorganization meeting of the United States Rubber Co., Col. Samuel P. Colt was re-elected president. Other officers elected were: James B. Ford and Lester Leland, vice presidents; Homer E. Sawyer, in charge of footwear; Ellisha S. Williams, in charge of mechanical division; W. D. Parsons, comptroller and treasurer; W. H. Blackwell, assistant treasurer; Samuel Norris, secretary; John D. Carberry, assistant secretary; H. B. Hubbard, assistant comptroller; W. O. Cutter, assistant comptroller, and George E. Smith, auditor.

The executive committee will be composed of Samuel P. Colt, James B. Ford, Lester Leland, Walter S. Ballou, Nicholas F. Brady and Charles B. Seger. The operation council will consist of James M. Dunn, chairman; Homer E. Sawyer, E. S. Williams, Ernest Hopkinson and Theodore Whittelsey.

SIGNAL TRUCK WILL INCREASE PRODUCTION.

The Signal Motor Truck Co. will not be sold to the Paige-Detroit Motor Car Co., as it has become known that the offer submitted the passenger car manufacturer has been definitely rejected.

Plans have been made for increased production of Signal trucks as a result of the constant growing demand. There is also a report that government officers have been in Detroit looking over the company's plant and getting general information about the product. Only recently a contract to supply the government with Signal trucks was carried out by the Paige-Detroit Motor Car Co. for the Signal Motor Truck Co.

A number of prominent Detroit men offered to become interested, it is said, in the company. The stockholders for the Signal truck, however, decided that they were amply able to in every way look out for the financial details. The company's report shows the Signal to be in a healthy financial condition.

The Signal Motor Truck Co.'s product has a number of years' actual service to its credit and is distributed throughout the country by some of the most successful motor truck merchants. The factory affairs are in the hands of John Squires, general manager, and the sales manager is A. D. Kelley. The concern is manufacturing trucks, ranging in size from one to five tons, the list selling price being from \$2000 to \$5000.

"There have been a number of statements concerning the affairs of the Signal Motor Truck Co.," General Manager Squires said in answering inquiries. "But," he continued, "we have been too busy arranging for increased production to pay attention to reports of the purchase of the Signal Motor Truck Co. We, however, fully realize the merits of the Signal truck and our obligations to our distributors and customers. We have accordingly arranged our plans to make our future and that of our distributors and customers one to be proud of. The Signal Motor Truck Co. will continue to manufacture the various sizes of Signal motor trucks on an increased production basis right here in our present Detroit factory. I cannot discuss our plans for government business."

HAYES WHEEL COMPANY MADE 3,912,297 WHEELS.

The Hayes Wheel Co., Jackson, Mich., manufactured 3,913,297 wheels during 1917, which is an increase of more than 1,000,000 wheels over the 1916 production of 2,732,264.

No Shortage of Petroleum

Mark L. Requa Oil Director Says There Is No Intention of Limiting Gasoline Supply for Motor Cars

There is no shortage of petroleum for our immediate needs, according to Mark L. Requa, director of the oil division of the U. S. Fuel Administration. The lack is one entirely of transportation. Gasoline must be produced as a by-product in the manufacture of fuel oil used in the navy, in merchant ships and in industrial plants, and the gasoline must be disposed of. Crude oil containing the lighter, volatile oils, such as gasoline, is dangerous for fuel purposes until the gasoline is removed.

Obviously, unless this gasoline is sold and consumed the cost of fuel oil will increase. There is, therefore, no intention on the part of the fuel administration to shut off or limit the supply of gasoline for use in motor vehicles.

"There has been considerable discussion as to cutting off the supply of gasoline to passenger vehicles, following the precedent set in England," said Mr. Requa, "but the conditions are entirely dissimilar for the reason that England produces no oil and has to rely entirely upon exports overseas. The United States, on the contrary, not only produces the oil for its own consumption, but large surplus quantities for export.

"It has been demonstrated recently that it is impossible to take oil for any specific purpose without exerting a detrimental influence on some other branch of the industry. The problem of what is least essential is an extremely difficult one to determine, and I am somewhat of the opinion that the non-essential industry does not exist.

"It is quite obvious that the oil facilities of the United States must be used in such a way as to produce the maximum benefit viewed from a national standpoint to meet the existing crisis.

"The priority list was established for the reason that it is impossible, because of transportation shortage, to supply all consumers. When the supply is sufficient the priority list automatically ceases to operate. When a shortage does exist class 12 receives no oil until all lower numbered classes are supplied.

"Total stocks in the United States approximate 160,000,000 barrels as of Jan. 1. Last year's production approximated 320,000,000, and there was a draft on stock of about 20,000,000. There is ample oil territory available in various parts of the United States. It is only a question of drilling to secure it."

Forty-one per cent. of all automobiles registered in Minnesota are owned in communities having a population of less than 1000, and less than 30 per cent. in cities of 10,000 or more population. More than half of the cars in the state are owned in villages or communities having 2000 or fewer residents.

Of the 39,086 cars sold in the state

during 1917, farmers and residents of villages having no more than 2000 population bought 19,301, or very nearly one-half, while 14,940 were purchased in communities of fewer than 1000 persons.

An investigation of this subject made by the Standard Farm Paper Association, shows that in 11 towns in good farming and dairying territory, ranging from 5000 to 20,000 and having a combined population of 95,336, the number of motor cars owned on Nov. 1 last was 10,637, or one for every nine persons, while in eight towns of similar size located in mining and lumbering areas, with a combined population of 65,290, only 4036 cars were owned, or one for more than 16 persons.

This is concrete evidence that the farmer has a high appreciation of the utility of the motor car in his business. This is easily understood when it is remembered that the farmer is dependent entirely upon his own means of transportation, has long distances to go to market and his time is needed on the farm rather than on the road.

SELDEN TRUCK SALES CO. INCREASE CAPITAL.

The Selden Truck Sales Co., which acts as distributor for Selden motor trucks, has increased its capital to \$750,000 to finance the increased volume of its business. This action was taken at a meeting of the stockholders prior to the meeting of directors at which the following officers were elected: President, George C. Gordon; first vice president, William C. Barry; second vice president, Robert H. Salmons; secretary-treasurer, Hal T. Boulden, formerly sales director of the company, was elected vice president of the company in charge of sales and advertising.

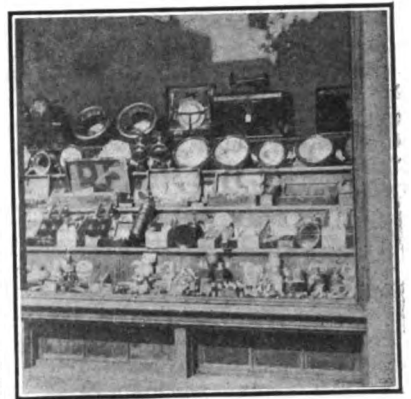
Wilbur F. Reynolds, formerly export manager, was made third vice president in charge of foreign sales, and Charles E. Williams, a new man in the Selden organization, was named as assistant sales manager. C. H. Mason is now assistant sales manager and advertising director.

TEXAS CAR DEALERS HOLD ANNUAL ELECTION.

The second annual convention of the Texas Automobile Dealers' Association was recently held at San Antonio, Tex. Officers were elected as follows for the ensuing year: President, F. A. Weinrich, San Antonio; vice president, Roy Munger, Dallas; H. H. Bryant, San Antonio; George Conant, Houston; treasurer, W. F. Rose, Dallas; directors, W. G. Langley, Dallas; Hob Diggs, Fort Worth; H. L. Miller, San Antonio and P. G. Stokes, Big Springs.



Accessories Department



"J. H." TONNEAU SHIELD.

The "J. H." Tonneau Shield is adaptable for use on any car built and is simple, durable and dependable. The shield consists of a main frame with two folding wings fitted with glass. It is mounted on a pair of extending steel arms, which are attached to a pair of steel body irons, which in turn fasten securely to the frame of the front seat beneath the upholstery. When once raised a push enables one to open or close the shield and place in whatever position desired, whereupon it is held by the friction locks. The side wings are simply turned to whatever position desired and they lock by friction. Placed at an angle they deflect the wind. When the shield is not in use it folds against the back of the front seat, taking about the same amount of room as would a robe. The makers claim it will not rattle or break.

Manufactured by the "J. H." Tonneau Shield Co., New York City, N. Y. Write for prices.

RED SPOT SEARCHLIGHT.

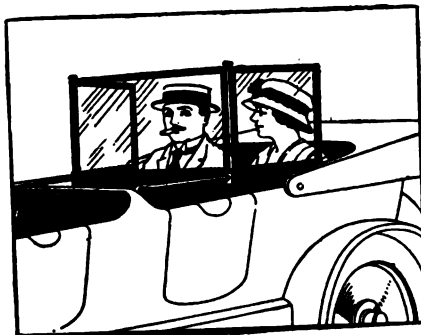
In addition to the beams of the headlight there often is need of a powerful spotlight for illuminating sign posts and for trouble shooting at night, while if one is to park the car in the evening it is advantageous to have a red light in front as well as in back.

The F. W. Wakefield Brass Co. has brought out a searchlight larger in size and of greater power than the average spotlight. It is seven inches in diameter and has a 30 candle power lamp. The operator of the car may flash either a white or red beam of light from the lamp by turning a switch, making it serviceable either as a spotlight or danger signal.

Manufactured by the F. W. Wakefield Brass Co., Vermillion, O. Write for prices.

TILTING STEERING WHEEL.

A Tilting Steering Wheel for Fords has recently been placed on the market by the L. P. Halladay Co. It may be mounted on the steering post, replacing the regular wheel, and requires no changes but the removal of a nut, and the substitution of a new spider. The device consists of a special spider having one arm hinged so as to allow up-



"J. H." Tonneau Shield.



Red Spot Searchlight of Great Power with Red and White Rays of Light.



Tilting Steering Wheel Gives Extra Room for Admittance to Operator's Seat.

tilt of the wheel and an easy entrance to the driver's position. This wheel is made in 15 and 17-inch sizes, with a choice of plain or corrugated rims, whereas the replacement of the original rim may be made if desired. This comfort should readily be recognized by the Ford owner, as it requires no extra effort to handle it. Locks automatically and is finished in black Japan.

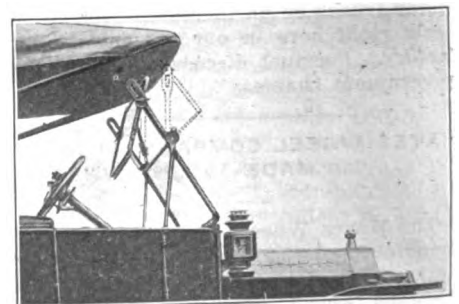
Manufactured by the Halladay Co., Streator, Ill. Prices: 15-inch spider, \$3; 15-inch spider with rim, \$4; 17-inch spider with rim, \$5; corrugated rim, either size, \$1.

BANKER WINDSHIELD.

Riding in the front seat of a Ford on a hot day, the discomfort due to the lack of circulation of fresh air, a rain storm makes it necessary often to put down the windshield on account of the inability to see the road ahead through the moisture accumulated on the glass, thereby subjecting the operator to the unpleasantness of getting wet.

The Banker Windshield was designed to overcome these conditions. This attachment will convert a standard Ford shield into one that may be easily and quickly adjusted to many different positions. It is simple to replace the present hinges with a Banker attachment. The same screws and screw holes are used and the exchange can be made without even taking the windshield off the car. It can easily be done in a short time by anyone. The hinges are of the friction type and by a slight turn of the wing nuts the upper section of windshield can be adjusted to any position.

Manufactured by the Banker Windshield Co., Pittsburgh, Pa. Price, \$1.50 per set.



Banker Adjustable Windshield for Ford.

S R B STANDFORD BEARINGS.



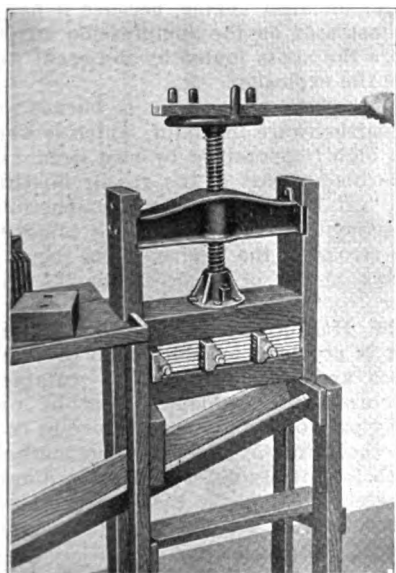
This new member of the S R B Taper Bearing family is a strictly high-grade bearing in every particular of design, material and workmanship. It is produced from the highest grade of chrome alloy steel, is made with the same care as the regular S R B Taper Roller Bearings and will give the same high degree of service and satisfaction. It is a bearing that absolutely prevents the rollers from going out of line. Race and cone are ground and the rollers cut to a perfectly true taper, making the bearing run freely. It is easily installed and will withstand strains that tend to destroy the regular bearings.

Manufactured by the Standard Roller Bearing Co., Philadelphia, Pa. Write for prices.

AMBU PLATE PRESS.

The negative plates of the storage battery quite often require pressing on account of the bulging of the active material and to straighten the grids should they buckle. The Ambu Plate Press was devised for this purpose. There are no metallic sections that can be reached by the dripping acid and whatever acid that is squeezed from the plates is run through a trough into a receptacle so that no injury is done to the floors. It will press three groups of plates at the same time.

Manufactured by the American Bureau of Engineering, Chicago, Ill. Price, \$32.50.



Ambu Press for Straightening and Compressing Battery Plates.

COTTER PIN PULLER.

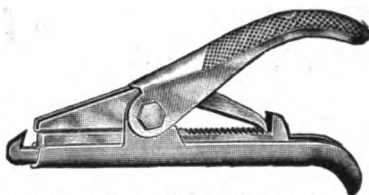
How many times have you strained to reach a cotter pin—probably located in some inaccessible place—and after spearing for it with a screw driver, either given up in disgust and nursed your bruised knuckles, or if you did get it out and dropped it into some vital part of the machine.

The May's Cotter Pin Puller was designed to get away from all this trouble. It reaches after the cotter pin, straightens it if bent and once taking hold, withdraws it in safety and holds it until released.

In a garage or repair shop where much of this work has to be done this tool will save much time and trouble.

The puller is well machined, mechanically correct and is finished with a heavy nickel plate to prevent rusting.

Manufactured by the Brewer Titchener Corporation, Cortland, N. Y. Write for prices.



Cotter Pin Puller Which Extracts Bent Pins and Retains Them in Its Jaws.

CUNO AUTO CIGAR LIGHTER.

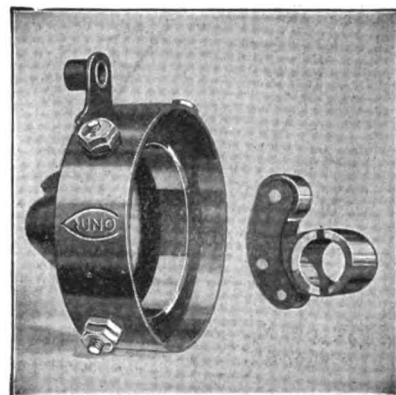
The electric cigar lighter fills a much needed want on the motor car. The Cuno Auto Cigar Lighter is simple, efficient and reliable. The burner tip is made of heavy wire and will last indefinitely. It is equipped with six foot cord that automatically rewinds after being pulled out for use. It is finished in nickel and mounted upon the dash by drilling a hole 25/32 of an inch in diameter and inserting the neck from the rear of the dash and tightening nut. A resistance coil is furnished for use with cigar lighter on cars having either 12, 18 or 24 volt batteries. Connecting the battery wire to one end of the coil, connecting other end of screw on round fiber disc on side of the lighter and connecting the other screw to ground makes lighter ready for use.

Manufactured by the Cuno Engineering Corporation, Meriden, Conn. Write for prices.



Cuno Cigar Lighter.

THE CUNO TIMER.



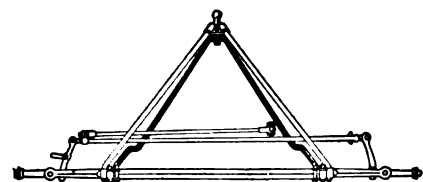
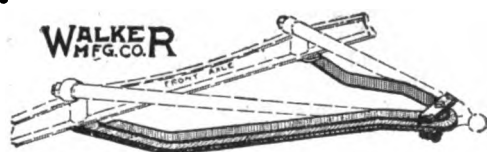
The Cuno timer is designed to meet the demand for a high class, well built timer for replacement on Ford cars. It is made of light weight steel and is practically indestructible. It is finished in black enamel. The construction is such that it can be attached to any model T Ford car without any change. Constant lubrication is affected by splash from an oil well formed by the groove behind the fiber ring, which is filled occasionally through the oiler. The roller assembly is light, simple and strong. The roller and pin are made of special steel and are hardened.

Manufactured by the Cuno Engineering Corporation, Meriden, Conn. Price complete, \$1.50.

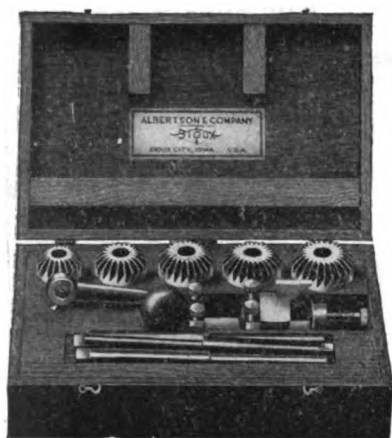
FORD AUXILIARY RADIUS RODS.

Designed for strength and for reinforcing the regular Ford radius rods they assist and brace the front axle, keeping it straight, thus bracing and preventing the breakage of the regular rods. They are attached without drilling, for they simply clamp onto the rear of the regular rod and are fastened to the axle by using the regular Ford perch bolt. Made of solid three-quarter-inch steel rods, with malleable clamp, the outfit weighs 12 pounds. There is another type made of 1x1 inch angle iron, weighing eight pounds, and a still lighter type of angle iron stock weighing five pounds and a tubular type of the same weight.

Manufactured by the Walker Manufacturing Co., Racine, Wis. Prices from \$2 to \$4.



Ford Auxiliary Radius Rods for Use When Chassis Is Converted.



SIoux REFACING TOOL.

Doing a lot of unnecessary work all day long is the old way of grinding valves. You have a choice of making a necessary time charge that your customers are bound to kick on, or giving the job less time than it should have. With the Sioux way you fasten any valve of standard make into the Sioux Refacing Tool and in a shorter time by far than it takes with the old way you can turn out a quick and well finished job. The cutter is made of fine grade tool steel, hardened and tempered to stand real service. Cutters 30, 45 and 60 degree are 75 cents each.

Manufactured by Albertson & Co., Sioux City, Ia. Price of outfit complete with 45-degree cutter, \$6.

DISTEEEL WHEELS.

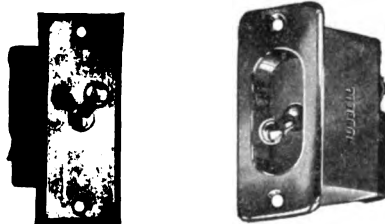
Steel wheels for automobiles mark a great improvement in wheel construction. The Disteeel Wheel, a product of the Detroit Pressed Steel Co., was exhibited at the New York Show for the first time and is already standard equipment for some of the more costly cars. The steel wheel has gained great popularity, especially on the larger and heavier cars. In the Disteeel Wheel, a concave steel disc that is mounted with the concave side outward takes the place of spokes. The disc proper is thickest where it is attached to the hub, tapering slightly towards the rim. By reason of this construction road shocks and strains are widely distributed. The weight of the wheel is largely at the hub, so that the flywheel action of wood wheels caused by the heavy weight at the rims is almost entirely eliminated. The integral rim has been approved by the Tire and Rim Association. To remove the outer rim it is necessary only to take off 11 nuts with a socket wrench on a 34-inch wheel. The pressure in the tire, combined with the force brought to bear by the rim nuts serve to clamp the two sections of the rim firmly to the disc, which makes possible the use of a much thinner disc than would be safe with any other fastening. It requires little time to clean a disc wheel and they serve in a large measure to screen the springs, axles, rods and other parts.

Manufactured by the Detroit Pressed Steel Co., Detroit, Mich. Write for prices.

"RIMCO" PLIERS.

Heretofore the average insulated plier offered to the accessory trade has been of hard rubber stock, which is not practical for rough usage. The "Rimco" Plier stands the hard practical service required for all types of high-tension work and the insulating compound is of such material that it is semi-soft instead of hard, therefore, it will not crack or break when dropped upon a hard surface. These pliers are indispensable to the man who considers "safety first" in making repairs and are handy in the equipment of automobiles and trucks.

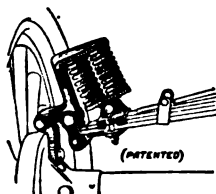
Manufactured by the Rubber Insulated Metals Corp., Plainfield, N. J.



THE HUBBELL TOGGLE SWITCH.

This newly devised switch mechanism is quick to work and slow to wear. It drops instantly into place and will quickly break the connection with a flip of the lever. It is easily installed upon the dash and requires no complicated movement of the fingers to send it into action. With the handle up the current is on and with the handle down the current is off. It also comes with a key that is easily detached, making the switch fool proof. All types are made, meeting the regular standard and special switch requirements.

Manufactured by the Harvey Hubbell Co., Inc., Bridgeport, Conn. Write for prices.



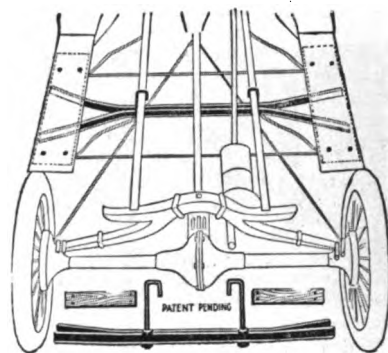
CHAMPION SHOCK ABSORBER.

These shock absorbers are built exclusively for Ford cars and are designed to absorb the jar and recoil from the springs.

The pivot seat of the two coil springs act as a bearing for the main springs and allow free oscillation of the working parts. The car rides on the springs and off the springs, equalizing each motion in balance, making the action of one spring compensate for that of the other.

They are easily attached and require no attention when in use.

The Champion Shock Absorber Sales Co., Indianapolis, Ind. Two for the rear wheels, \$8; set of four, \$15.



PRESTO BODY BRACE.

One of the first points of wear on a Ford car is in the breaking away of the front mud guards from the running board. This is caused by the excessive strains and vibrations. The Presto Body Brace is designed to strengthen this part and is made up of two pieces of channel iron placed back to back, securely riveted together with a spacer between them. The channel irons are separated slightly by the spacer, which allows room for two bolts, which are formed into a hook at the top. These are hooked over the main frame work of the Ford chassis and the ends of the channel iron project out on either side under the running boards. Two extra pieces of board are furnished, which fit underneath the running boards for a distance of about 36 inches and when the nuts on the bolts which hook over the frame are tightened this body brace forms a perfect support for the running boards and binds the frame work and body of the car together, thus stopping vibration.

Manufactured by the Metal Specialties Manufacturing Co., Chicago, Ill.

FLAMELESS COMBUSTION PLUG.

One of the late improvements in the gasoline motor field is the discovery that catalytic combustion will keep the carbon burned off the spark plug insulator on the smokiest engine, because it heats the insulator on the compression stroke before the air is fouled by the spent gas from the explosion.

The carbon and smoke is burned off the earthenware insulator, which is kept at a high temperature by heat produced in burning a part of the gas-air mixture by "catalytic flameless combustion" throughout all the time of the compression stroke of the engine, when there is always plenty of fresh air in the cylinder.

The Harding Non-Carbonizing Spark Plug is provided in addition to the electrodes and insulator with a catalytic structure, which produces heat by oxidizing part of the air-gas mixture in contact therewith by the catalytic method, which is entirely different from ordinary flame combustion, the kind that inflames or explodes the gas charge and produces power.

Manufactured by the Flameless Combustion Spark Plug Co., Chicago. Write for prices.

**OIL STRAINER.**

(Figure 402.)

From the constant removal of oil from automobile engines being repaired in a garage comes the need of an oil strainer, as much valuable lubricant can be reclaimed in this way that otherwise would be wasted. The accompanying sketch shows such an oil strainer that will filter the dirt and foreign matter from oil and make it useable again for most any purpose.

The oil to be reclaimed is put into the tank at the left, from which it flows down through the outlet pipe and forces its way up through the fine wire mesh screen shown on the filter tank at the right. This screen is set in a hoop, which is removable for cleaning, and the cloth screen above is also set over a hoop so that it can be changed when clogged up. A receptacle can be placed under the outlet of the second tank to receive the purified oil, which rises to the top.

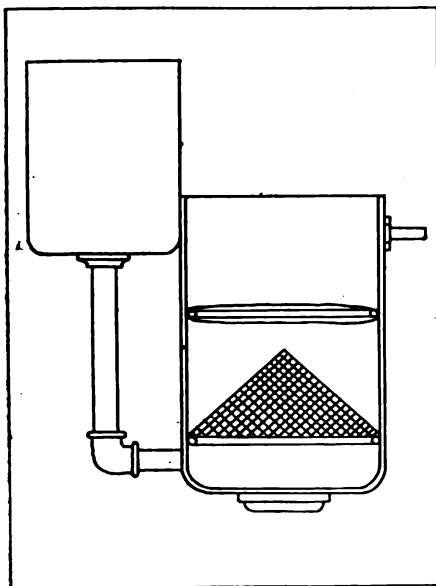


Figure 402.

TOOL TO HOLD PISTON RINGS.

(Figure 403.)

Much trouble is encountered in replacing pistons into the cylinders on account of the inability to clamp the rings properly and many suggestions of practical value have been offered by our readers.

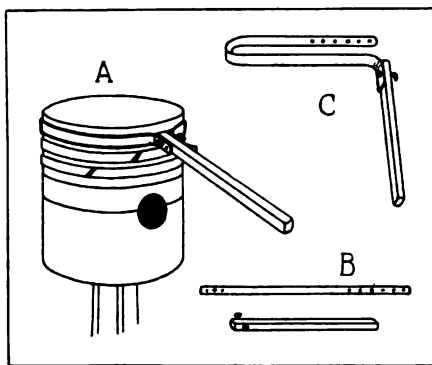


Figure 403.

For practical results the following suggestion and sketches are herewith described and illustrated.

This tool is made with a short length of steel or iron bar in which a hole is drilled. A strip of steel tape or iron ribbon is attached to one end of this bar by punching a hole in the tape and driving a stud through the tape and hole turning one end of the stud into a hook. The other end of the tape is punched at regular intervals with holes, whereupon the tape can be pulled around the piston ring and clamped to the stud. This device will allow the ring to slip by the tape upon entering the cylinder.

EXTRA HAND FOR TIRE CHANGES.

(Figure 404.)

In changing the Ford tire, when alone, there is often the need of an extra hand to hold a tire tool in place while manipulating the other tool and screw driver to wedge the tire off the rim. A good substitute for this extra hand in this work can be made by making a link of steel or iron wire about one-quarter inch in diameter and about four inches long from end

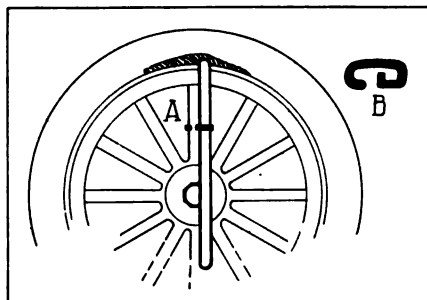


Figure 404.

to end and about two inches wide at the end which goes about the spoke and an inch wide at the other end which holds the tool. The accompanying sketch shows how this link can be used to advantage in the removal of a tire.

FORD STEERING COLUMN BRACE.

(Figure 405.)

In getting into the driver's seat in a Ford car, the driver, following the line of least resistance, invariably uses the steering wheel to swing himself into position for driving. Continual use of this method makes the steering column wabby, thus weakening it. To overcome this condition a suggestion is hereby given, together with a sketch showing the construction of a brace that will restore its rigidity.

Two short lengths of steel or iron bar are drilled and bent to the position illustrated and attached to the steering column and to the dash. When tightened this brace will support the steering column and do away with all play and rattles.

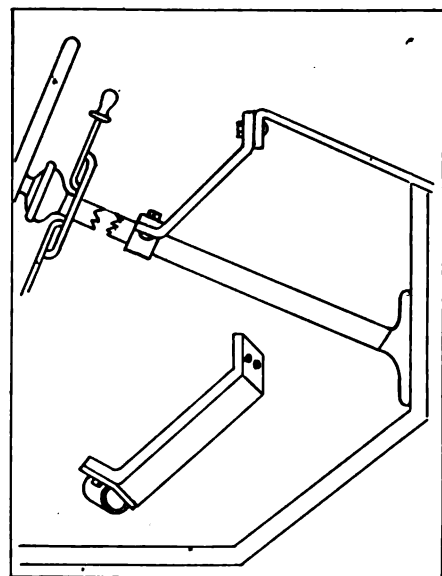


Figure 405.

It is often desirable to use paraffin on the automobile in various places, such as the terminals of the storage battery. The most convenient way to use it is in its liquid state, but to liquify it the paraffin must be heated, and it cools rapidly.

Automotive and Accessories Show

Big Exhibition of Accessories, Trucks, Tractors and Motorcycles on Chicago Municipal Pier

The Municipal Pier, Chicago, built as a show place as well as a utility, and open to the public for two years, will be used for the second annual exposition of what was originally known as the National Exposition for Ford Accessories, but which henceforth probably will be known as the Automotive and Accessories Exposition. The Coliseum housed the first show of this exposition, but the officers and directors of the show organization believe that a greater success will be attained by the second show by reason of holding it on the pier, which is, in the opinion of men who are thoroughly familiar with what constitutes a proper setting for shows of this character, the most logical place for an event of this kind in America.

Directors of the National Exposition for Ford Accessories recently held a meeting at which a change in name of the organization, dates for the show and the building in which to hold the show were decided upon. With a two-thirds vote of the stockholders, which seems likely to be obtained, the organization will change its corporate title to Automotive and Accessories Exposition, Inc. This, it is believed, will be more in keeping with the enlarged scope of the body and its plans, which are to include not only accessories for Fords, but for all cars, and in addition will admit for exhibition, trucks, tractors and motorcycles, but not passenger car exhibits.

Originally it was intended to hold the show the week beginning Sept. 21, but this has been changed and the date moved forward one week to come sufficiently close to the official closing of the pier with an interval for decorating. Motor shows in the past have necessarily had many aisles, here there will be but one. Space which one exhibitor gets will be just as choice as another. An unobstructed space nearly a half mile long and 68 feet wide being available.

There are two sections to the pier, with a wide driveway between. This driveway will be parking space and sufficient room between several banked rows of parked cars for truck and tractor demonstrations. Surface cars loop the full length of the pier, the north side boulevard system passes it and motor buses, together with steamboat transportation from the river and Grant Park will offer ample means of getting to and from the show. Whereas parking space has been limited at other shows, here there is plenty of room and there will be no danger of having cars stolen, for two men will check the cars in at the entrance and demand a check of everyone driving a car out of the pier.

At the extreme outer end of the pier is an immense auditorium in which conventions will be held every day of the show. Through the efforts of the several

show committees and the convention bureau of the Chicago Association of Commerce, such bodies as the Farmers' Institute, the Illinois Garage Owners' Association, the Illinois Highway Improvement Association's big meeting to wind up the \$60,000,000 road bond issue campaign, the National Hardware Dealers' Association and the Motorcycle Manufacturers' Association and others will be induced to hold their sessions in the Pier Auditorium during show week.

The Chicago speedway management has tentatively promised to hold its fall derby on the opening date of the show and it is possible that the exposition will offer a cup to the winner of the event.

J. E. Duffield of the Dailey Non-Stall Differential Corporation, is president of the show organization, and B. L. Gray of Gray-Heath is treasurer. H. V. Buelow, who managed the show last year, has been re-engaged and will open offices shortly in the New Southern Hotel, Chicago.

Paige Co. Erects 3 New Buildings

Main Plant Will Be Enlarged With Addition Providing 66,000 Square Feet of Floor Space.

The steady growth of the Paige-Detroit Motor Car Co., together with the extra demands made by the war and the addition of a new Paige truck department, has necessitated greater facilities, both in the manufacturing and the executive end of the business. As a consequence there are now under way three new buildings that will add 66,000 square feet of floor space for general manufacturing and production purposes.

These three buildings are being constructed on the extensive vacant property directly across the street from the main plant of the Paige company and will comprise units of the central groups. There are several other units in another part of the city. Two of the new buildings will be used for temporary storage purposes for Paige products in transit from finishing rooms to transportation platform. The third new building will be entirely a construction plant. The new structures will be built of brick, steel and steel sash, providing abundance of light.

In addition to these new buildings the Paige is preparing to add two units to its executive building, which will increase the space by 50 per cent. and which will provide for the requirements of the new Paige truck department of

officials, as well as for other purposes caused by increased business.

CHAMPION EMPLOYEES ALL SUBSCRIBE TO NEW LOAN.

All of the employees of the Champion Ignition Co. subscribed to the Third Liberty Loan, the amount subscribed being \$45,000. The Champion Ignition Co. as a firm also took bonds to the amount of \$50,000.

Women Conduct a Reo Drive-Away

A Squad of Khaki-Clad Drivers Pilot Cars From Lansing to Atlanta, Ga.

People along the Dixie Highway in the rural sections were almost lead to believe recently that the women had been called to the colors, as in this belief only could they account for the appearance of a fleet of Reo trucks passing along, nine of which were operated by women drivers clad in khaki. There were 10 of the Reo trucks in the fleet, which left Lansing, Mich., April 2, under the direction of K. T. McKinstry, sales manager of the Reo Atlanta Co., Atlanta, Ga., who drove the truck that led the way. The woman drivers, a squad of the Atlanta division of the National League for Women's Service, who are subject to call at any time for government service, were under orders from the Georgia state guard. Capt. Katherine Van Ecyk Harrington was in command, and with Lieut. Courtney Billups, a sergeant, and six privates, comprised the squad.

The itinerary of about 1025 miles between Lansing and Atlanta was covered in about seven days. When the trucks arrived at Jeffersonville, Ind., they were loaded with supplies for Camp Gordon and from that point on were accompanied by a guard.

EXTENSIVE ROAD BUILDING PROGRAM ON IN ILLINOIS.

A more extensive road building program is in view in Illinois than has ever before been considered. Illinois is making a determined effort to "pull out of the mud" this year. The cost of building the new roads contemplated in the state reaches \$3,000,000.

The most important improvement will be made upon the Lincoln Highway from Geneva to Fulton on the Mississippi river and on the Lincoln Highway feeder from Geneva to the City of Chicago. In furtherance of its purpose to establish at least one military road from coast to coast the Federal government has indicated the Lincoln Highway through Illinois. With the completion of several miles of concrete surfacing on the Lincoln Highway in Cook county the route across the state will be practically completed by the end of the year.

H. J. DETTERICH ADVERTISING MANAGER OF BEARINGS SERVICE.

A. K. Hebner, general manager of the Bearings Service Co., has announced the appointment of H. J. Detterich as advertising manager of the company. Mr. Detterich, who takes up his new duties on April 15, leaves the Paige-Detroit Motor Car Co., where he has held the position of assistant advertising manager for the past two years. Previous to this he was connected with the advertising department of the Studebaker corporation. "In having Mr. Detterich come with our company," said Mr. Hebner, "we feel that we have a man who is exceptionally well fitted to fill this new position in our organization, which it has been necessary to create in order to have an executive who can devote all his time to the large volume of advertising incident to a company which has 22 branches and over 500 distributors."

JERSEY MOTOR RECEIPTS SHOW BIG INCREASE.

Receipts of the Motor Vehicle Department of New Jersey in March amounted to \$234,759.47, which was an increase over the same month of 1917 of \$128,783.38 according to an announcement made by Commissioner William L. Dill of Paterson. A check for the amount was turned over to William T. Read, state treasurer. Commissioner Dill also stated that the receipts for the first three days of the present month amounted to more than the corresponding period last year, and that in Newark on Tuesday the total number of motor examinations was 311 and in Camden 272, thus showing an increased demand for the use of the automobile.

NEEDLESS CORRESPONDENCE WITH THE GOVERNMENT.

Owing to the enormous increase of government war work, the governmental department at Washington is being flooded with letters of inquiry on every conceivable subject concerning the war, and it has been found a physical impossibility for the clerks, though they number an army in themselves now, to give many of these letters proper attention and reply. There is published daily at Washington, under authority of and by direction of the President, a government newspaper—The Official U. S. Bulletin. This newspaper prints every day all of the more important rulings, decisions, regulations, proclamations, orders, etc., as they are promulgated by the several departments, and the many special committees and agencies now in operation at the National Capital. This official journal is posted daily in every postoffice in the United States, more than 55,000 in number, and may also be found on file at all libraries, boards of trade and chambers of commerce, the offices of mayors, governors and other Federal officials. By consulting these files most questions will be found readily answered; there will be little necessity for letter writing; the unnecessary congestion

of the mails will be appreciably relieved; the railroads will be called upon to move fewer correspondence sacks, and the mass of business that is piling up in the government departments will be eased considerably. Hundreds of clerks, now answering correspondence, will be enabled to give their time to essentially important war work, and a fundamentally patriotic service will have been performed by the public.

ECKENRODE SALES MANAGER OF FULLER & SONS MFG. CO.

Fuller & Sons Manufacturing Co. announce the appointment of J. E. Eckenrode as their district sales manager, with headquarters at 1512 Kresge building, Detroit, Mich. Mr. Eckenrode has been with the automobile industry eight years.

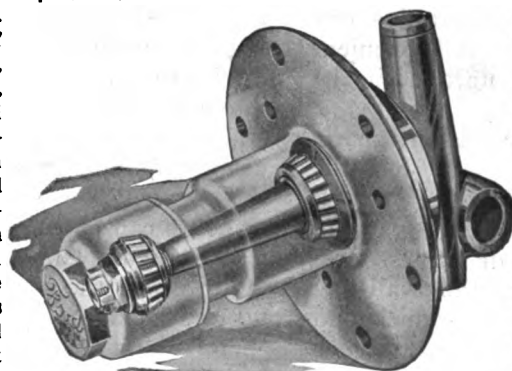
ADVANCE FOR FORD PARTS.

The Ford Motor Co. has announced that an increase in the price on a number of Ford parts went into effect on April 1.

WRIGHT ROLLER BEARING.

A roller bearing for the front wheel spindles of the Ford chassis, identical in design with bearings now used for many trucks and passenger cars, is now being marketed by the National Bearings Service Co., Philadelphia, Pa. This bearing is manufactured by the Wright Roller Bearing Co., and is unique in that there is no cage or retaining mechanism to hold the rolls in the raceways, so that more rolls are used than in any other type of roller bearings. The makers claim that the gain in number of rolls is approximately 50 per cent., as compared with average types, and that the load carrying capacity of the bearing is above other makes of the same size. The bearing has been produced for the National Bearings Service Co. to meet a demand believed to exist among Ford owners for equipment more enduring than ball bearings of the cup and cone type, which will increase the endurance and efficiency of Ford machines. The bearing will fit the wheel spindles without mechanical changes and can be installed as easily as the bearing now used for Ford chassis.

Marketed by the National Bearing Service Co., Philadelphia, Pa. Write for prices and literature.



Wright Roller Bearing Designed for the Ford Car.

Semi-Trailers Will Relieve Freight Congestion

H. C. Fruehauf Submits Interesting Statistics on Haulage. Truck Capacity Not Utilized.

"If the 435,000 motor trucks in the United States were operated at 80 per cent. of the efficiency possible with semi-trailers, the total tonnage hauled by these units every 12 months would be equal to 1,423,635 train loads of 55 freight cars each, or eight times as much as these trucks are now estimated to be hauling annually," declared H. C. Fruehauf, general manager of the Fruehauf Trailer Co.

"According to recent estimates the 435,000 motor trucks in this country have an average load capacity of 2½ tons each. However, careful investigation developed the fact that the average motor truck operates at about 35 per cent. efficiency. That is to say that a big majority of the motor trucks are not loaded to their full capacity while being operated.

"Assuming that each truck makes an average of four trips per day for 300 working days a year, the motor trucks now in service if operated with semi-trailers at 80 per cent. efficiency, and carrying a load in one direction, would show a gain per year of 6144 tons per truck or 2,672,640 tons per annum on all the trucks in the United States.

"If these trucks, equipped with trailers, could carry loads in both directions this annual gain would be equal to 106,905,600 freight car loads of 50 tons each. The magnitude of this extra tonnage is almost inconceivable, but it is 53 times the total tonnage handled through the Great Lakes during 1917.

"Increased operating efficiency in motor trucks is imperative. The freight car and locomotive shortage is so great that we should make the widest and best use of our transportation facilities.

"It is true that many manufacturers, lumber dealers and operators, and business men in other fields of industry have become aware of the economies resulting from the use of semi-trailers. But they are in the great minority.

"They know that a horse can pull a much heavier load than it can carry, but they are slow to apply the same reasoning to a motor truck.

"Our experience, based on practical demonstrations, has been that a semi-trailer and truck will haul three times as much as the truck alone—and over the same roads and under the same conditions. This fact goes to show that although production of trucks for use in the United States may be curtailed to a great extent, because of the government's demands, there is a practical way to treble the present motor truck tonnage in this country."

PLATE XX

GARAGE WITH QUARTERS FOR CHAUFFEUR

Suitable Type For Summer Place or City
Estate With Equipment For Use in Winter

Designed by the Architectural Department of The Automobile Journal.

FOR the summer place of an owner of two cars a garage should not only have complete equipment, but should afford quarters for a chauffeur, as it is not always convenient to provide living room for the car operator in the home or at a nearby place.

A garage which is quite ideal to meet the purpose of these requirements is shown in the accompanying plate and considering the facilities it affords it should prove cheaper in the long run for housing the car than one of the makeshift arrangements that are quite often erected by people for their summer estates. It is not an expensive or difficult type to erect and it can be made serviceable as a winter garage at a slight additional expenditure. The building is 32 feet wide and 40 feet long. A brick partition separates the interior of the building at a point about 20 feet back of the front and walls off the chauffeur's quarters, vestibule, wardrobe, closets and boiler room.

While primarily designed for housing, handling and maintaining two cars, the main garage floor is sufficiently large to accommodate four large machines without crowding the space. This affords the owner an opportunity of securing a rental from two other owners, or from three if he intends to keep only one car, and the income from this source would be a considerable item in defraying the expense of maintenance.

A capacious wardrobe containing closet and space for lockers adds to this feature of the garage, as it furnishes appointments that would be necessary where several car owners were to use the same building. Available space for two work benches beneath the double windows at the sides increases the capacity of the building from a service standpoint and double drains, one at the centre of either side, make it convenient to wash cars without moving them around in the building.

In the boiler room there is sufficient space, with proper arrangement, to provide for the storing of 10 to 12 tons of coal, or enough to last through the average winter.

A structure of this size, of course, requires a substantial foundation, the walls of which should be at least nine inches thick and extend $3\frac{1}{2}$ feet under ground. They should also

extend nine inches above grade to serve as an underpinning.

The main walls of the building are constructed of a frame of 2x4 inch studding erected on 4x4 inch sills with 4x4 inch plates. It is walled in with North Carolina pine boarding, seven-eighths of an inch thick, with a covering of one layer of red rosin paper and spruce clapboards laid $4\frac{1}{2}$ inches to the weather.

The interior partition walls are of brick, four inches thick, and should be built integral, where they join the walls, with the brick tiers, which should be erected between the studding as a means of strengthening the whole structure and increasing its fire-resistance properties.

The roof is of the hip type and is built up on a frame of 2x8 inch hip rafters and 2x6 inch jack rafters and is boarded in with hemlock boards laid two inches apart and covered with "extra" cedar shingles laid four inches to the weather.

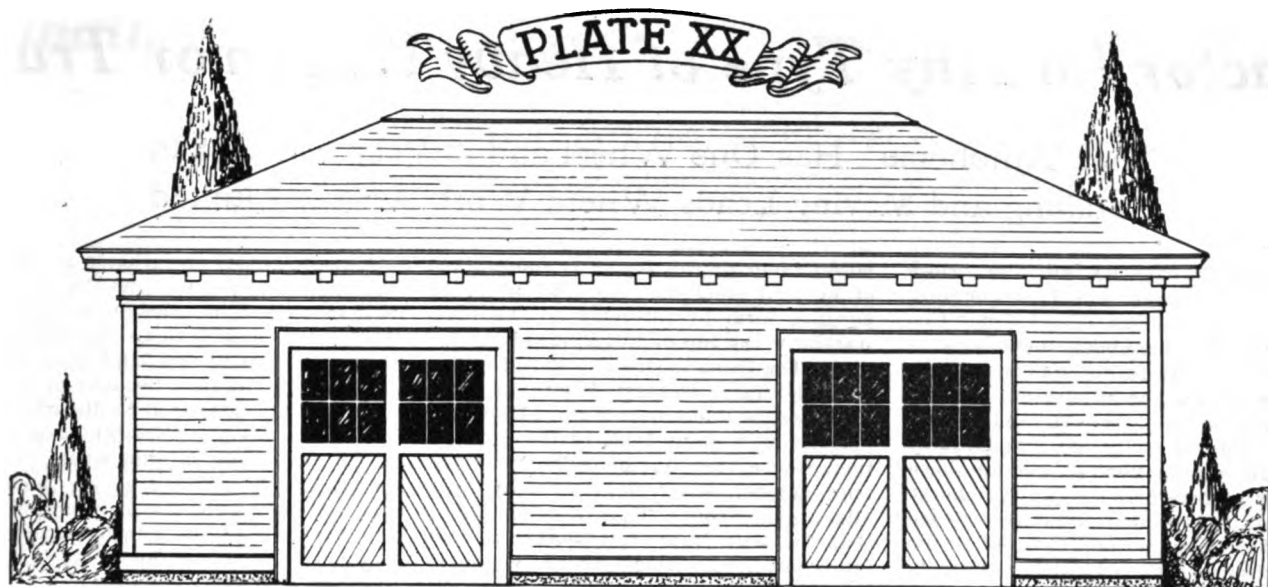
Soft pine or white wood is the most suitable wood for the exterior work, including the cornice, crown, fascia, bed mould, brackets, frieze and corner and saddle boards.

The ceiling joists are 2x8 inches, placed 16 inches off centre and covered with either pine sheathing seven-eighths of an inch thick or metal lathe if it is intended to plaster the ceiling. There are various types of all-metal ceilings which can be used to good advantage and are inexpensive, easily put on and which will lessen the fire danger.

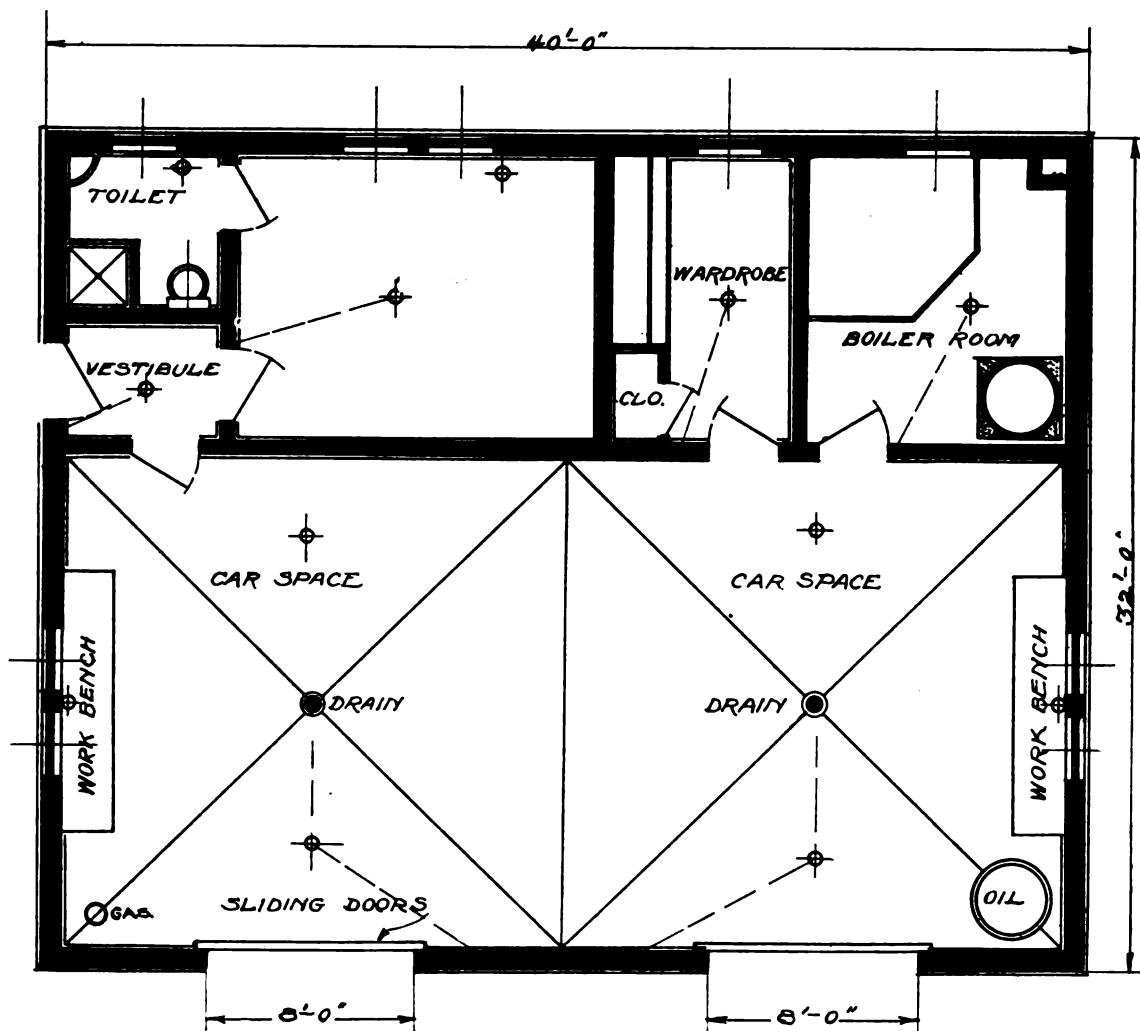
There are two large entrances in front, each enclosed with sliding doors, having large six-pane sashes in the upper two panels. This arrangement enables the driver to place his car in any position without the difficult manouvering inside the building that would be necessary with but one entrance.

There is also an entrance in the side opening into a vestibule leading into the chauffeur's room and garage proper. With this arrangement the chauffeur's apartment can be kept shut off from the garage room so that no disagreeable gases or odors can enter.

With complete equipment an installation as indicated on the plan, including heating apparatus and plumbing, this structure should be erected for about \$3500 under average conditions.



— FRONT ELEVATION —
SCALE



— PLAN —
SCALE

①

Tractor for Any Type of Heavy Wagon or Truck

The "Autohorse" Has One Wheel and Is Very Efficient In Handling and Moving Loads Where Work Area Is Limited

HAULAGE capacity of the Autohorse, a single wheel tractor unit, built by the One Wheel Truck Co., St. Louis, Mo., has been demonstrated very satisfactorily in different service in that city during the past year, particularly through the autumn and winter months. The company has standardized its design and is now producing these machines commercially. The Autohorse is comparatively small, weighs approximately 4150 pounds, and because of its construction can be worked in extremely limited area. Statement is made that the tractor and a semi-trailer of 10,000 pounds load capacity will be at least four feet shorter than a team of horses and a truck, and as it can be backed or turned in any direction, or it may be swung 180 degrees and while driving ahead push the trailer backward, it has a degree of

power plant or cab frame is constructed of pressed steel and one will note the peculiar form by reference to the illustration of the top of the stripped tractor unit. The front is straight and at either side the frame is formed with diagonal lines to the side members, which are parallel to a point back of the mid-section, where they narrow slightly to the rear member, which is straight and parallel to the front. This frame is wider than the main frame and overhangs it at either side, and being about the same length is extended beyond it forward.

The power plant frame is mounted on two semi-elliptic springs, one at either side of the single wheel, and the engine, clutch and transmission gearset in a unit are installed at the right side, while at the left side is a radiator, through which the water is circulated. The ra-

The weight of the tractor is so equalized that it is balanced on the one wheel and when it is coupled to a semi-trailer equipment equilibrium is maintained without stress of any kind upon the machine or its frame. Because of the fact that it is not subjected to distortion, and practically all of the weight centred beneath the single driving wheel, traction is practically positive at all times and there is no possibility of skidding. The arrangement of the power transmission system is not conventional, but it is none the less efficient.

The tractor as seen at the side appears low, but as a matter of fact it has more than ordinary clearance, and with the single wheel driving there is more probability of avoiding road obstructions than with two wheels.

The power plant is a Continental four-cylinder, water cooled engine, with cylinder bore of 3½ inches and stroke of five inches, this being rated at 22.50 horsepower by the S. A. E. formula, but will develop close to 30 when driven to maximum capacity. This engine is built with a detachable water jacket head and the cylinders are cast en bloc. The crank case is cast in two sections, the upper being divided by a vertical transverse web that carries the centre main bearing. The lower section serves as an oil reservoir. The water jacket of the engine block is cast integral with the cylinders and the chambers are large and free circulation of water is obtained.

The crankshaft is a three-bearing type, of large size, drop forged from special steel with the flywheel flange and thrust flanges at either side of the centre bearing integral. This is heat treated and ground to size. The camshaft is three-bearing, drop forged, with the cams integral. The cams are ground with unusual care. The timing gears are helical and are noiseless. The crankshaft, camshaft and connecting rod bearings are nickel babbitt, the crankshaft and connecting rod bearings being carried in bronze cages. The connecting rod caps are adjusted with steel shims. The valve mechanism is enclosed to protect it against the action of abrasives.

The engine is lubricated by a horizontal plunger pump driven by an eccentric from the camshaft that forces oil from a screened intake in the well in the reservoir in the base of the crank case through copper tube to the rear main bearing and the timing gearset, both of which are flooded. The excess oil flows to the troughs in the crank case, whence it is distributed by splash to the cylinders and piston, the connecting rod and camshaft bearings, the cams and tappets and the centre main bearing. The overflow from troughs is carried back to reservoir to be again circulated.



(Patent Pending.)

Autohorse One-Wheel Tractor Coupled to a Horse Drawn Vehicle, Practically All of Which Can Be Used for Practical Haulage.

mobility that is not obtainable in other type of tractor.

The Autohorse chassis consists primarily of a short U-shape frame, the curved end being the front, the rear ends of which are joined by a cross member, the corners being heavily gusseted. The frame is heavy pressed steel and is very rigid. The frame has a second cross member about midway of its length, and on the forward section is bolted a large external ring gear that is part of a turntable. The large pinion on the lower end of the steering column meshes with this ring gear and by turning the steering wheel the machine is controlled. This will be detailed further on.

The single driving wheel of the tractor is installed in the centre of the turntable and on this is mounted the power plant and the auxiliaries and the cab. The

diator is large, because the work is slow and ample radiating surface is necessary, and the weight of the water serves to balance the power plant. One will note from the illustration that the drive is unusual. The main shaft of the transmission gearset carries a bevel gear that meshes with a similar gear on the right end of a transverse shaft that is carried on heavy brackets. On the left end of this cross shaft is a sprocket, and from this a chain extends forward to a sprocket on the left side of the axle of the wheel, this axle being fixed in the wheel hub. In other words, the construction is such that the drive is around the wheel, instead of directly back. The driving chain can be enclosed with a guard so that it may be constantly lubricated and protected from all abrasive substances.

Handling Quality Goods Brings Jobbers Success

Albert Champion Talked to Accessory Distributors of New England On Relations Between Manufacturer, Jobber, Dealer and Customer

ONE of the interesting events during the Boston Automobile Show was a get-together dinner of the New England Accessory Jobbers, attended by Albert Champion, president of the Champion Ignition Co. Mr. Le Roy Pelletier was present and gave a talk on the healthy condition of the automobile business and the big possibilities in all its branches. Mr. Champion followed with a talk which was received with so much interest that we want to quote it in part for the benefit of the jobbers who were not present.

"My main object," Mr. Champion said, "in asking you to join me here is that you might become better acquainted with each other, as a better understanding will result in better business relations."

"I attended a luncheon yesterday at which Mr. Alfred Reeves spoke to 500 dealers, urging them to join the New England Dealers' Association in order to bring them into closer relationship with each other. He outlined all the benefits to be derived from cooperation and cited this instance for comparison: The National Automobile Chamber of Commerce of which he is manager, owns over 600 automobile patents, and any manufacturer who has been in business for a minimum of a year, operating in a successful and legitimate manner, can join the Chamber of Commerce and get the benefit of all those patents. This has been a very great factor in making the automobile business successful. Just consider for a minute the condition of the industry if each manufacturer owned a few patents and were continually fighting each other. Fortunes would be spent in litigation and the industry could never have grown, as capital would have been scared away. No one can deny the success of the automobile industry and this condition applies to you as well as it does to the automobile manufacturers."

Jobbers Getting Together.

"I am glad to state that I have found a marked improvement in the attitude of most jobbers towards their competitors. A few years ago, when calling on jobbers, I would hear so many grievances and so much 'knocking' that I wondered at times why these firms stayed in such a business themselves. Getting together is undoubtedly what has helped, as not only you get acquainted, but you can stop many evils that are detrimental to your business. For instance you will find on the jobbers' shelves special brands of goods and lines on which there is no demand, but which have the doubtful merit of being cheap, and when it is pointed out to a jobber that it is impossible for him to build a satisfactory business with that class of goods, as even

if he does sell them the dealer will be 'stuck,' most of them will answer: 'I know it isn't good; I also know there isn't any demand, but our competitor has a cheap line, is handling a special brand and we must have something to meet that competition.' That kind of competition isn't doing the jobbers any good. It simply results in raising their cost of doing business due to the small percentage of profit they make. The goods must be sold cheap and in many instances gotten rid of below cost. While this hard work is being done to salvage as much as possible from the original investment, the quality lines are being overlooked, as all attention is given to these cheap lines. The management tells the salesmen once or twice a year 'clean up that old stuff.' They are what you



Albert Champion, President Champion Ignition Co., Flint, Mich.

know as job lots, an accumulation of all kinds of goods for which there is no demand and they have to be sold in this manner. If more care had been taken in selecting the lines there would not be any job lots. The salesmen are furnished with a list of these job lots and told to unload them on the dealers. If these goods are no good to the jobbers they surely will be of no use to anyone else. What are the dealers going to do with them once they get onto their shelves? Do not forget that your success depends on the success of the dealers. The successful automobile dealers today are the ones that handle good automobiles, and the successful accessory dealers are the ones who handle good accessories. If you are going to build up your business on the right kind of basis you will have to think of the dealers. If you are going to give him advice or suggestions regarding the lines he

should handle don't hand him a job lot article or an unknown brand that he cannot sell.

Careful Selection of Lines.

"The only satisfactory way to build up business is to earn the confidence of your customers. Confidence will bring dealers to trade with you just the same as you personally go to the merchant in whom you have confidence, whether it be a grocer, shoe store or your tailor. The success of the accessory business is in your own hands, but you can only make it successful by handling quality goods. The lines should be selected carefully and you should investigate the methods of the manufacturer you are dealing with. In other words, you, too, must have confidence in the manufacturer whose product you are going to handle and be absolutely satisfied that he is the one with the best article in that particular line, as well as satisfy yourself that his business methods are in keeping with the character of the goods. You should check his advertising for the reason that anyone trying to 'put something over' through advertising claims cannot be trusted as he is trying to fool you and your customers. Just consider what it means when you and your selling force positively know that the line of goods you handle and recommend comes from a firm in which you have full confidence. It gives you and your men power to sell these goods; it gives confidence to your dealers when they realize the care you take in your selections and you are helping to make the dealers successful because the goods are going to give satisfaction to the owners. The success of your jobbing business depends upon this and deserves your highest consideration."

Better Service for Dealers.

"In handling quality goods you are going to find it much easier to give service to your dealers. In the past you have handled so many different lines and your money was tied up in so many brands that a good many of you could not keep a sufficient stock of any particular line that was moving fast. By reducing the assortment you will be helped financially because you will have goods that move a quick turnover of your money and you will be able to carry a good sized stock of the fast selling lines, thus being in a position to give good service to your dealers. By service I do not just mean the satisfaction you give to your dealers but also the speed with which you can fill their orders. Think of the number of times you have been short of some standard article and the dealer has been obliged to buy somewhere else, meaning the loss of money, the profit you would have made going to some one else and possibly your customer starting in to deal with another concern. Service

to the owner is also implied. Each one of us has had the experience of going into a store to buy one certain article and being attracted by a good display of neckties, hosiery or anything you may think of, with the result that we didn't leave that store without making an additional purchase. The same condition applies to the dealer's well kept stock of saleable supplies—his customers will buy the goods they can see and get right on the spot. On the other hand, if the owner is kept waiting when he wants something, he can't be blamed for patronizing catalogue houses.

Confidence Makes Success.

"I wish to touch on the subject of your sales organization. It is an excellent idea to give the salesmen an opportunity to check up their own work by furnishing them periodical reports of what they are doing. How are we going to bring the accessory salesmen up to the highest standard? Undoubtedly by paying them according to the amount of business they do and in relation to its cost. No doubt many of you are paying a bonus to your salesmen and I believe this is the proper way. It is my opinion that the salesmen should be paid according to the cost of doing business on the orders they take direct in their territory. After a percentage is set, a bonus can be established with relation to cost reduction which will enable them to earn large bonuses and at the same time effect a big saving for you. I believe that the management and salesmen should have meetings and "get-together" frequently as in such meetings experiences can be compared, customers can be discussed, the salesmen can express their opinions and relate what they may be 'up against' in their particular section. In these meetings the management has the opportunity to inspire the men with confidence by helping them and letting them help each other; by not merely telling them 'go out and sell this,' but by asking their opinions and letting them realize that they are an important part of the business, as no jobbing firm is better than its selling organization and confidence is what makes success possible.

Should Read Trade Papers.

"Another important matter is to read the trade papers. Keep posted on what the automobile industry is doing; read the articles that are written by merchants expert in the handling of accessories; take out subscriptions so that each one of your men will receive a trade paper at home. Possibly they do not think of buying trade papers or just buy one once in a while. Every salesman is trying to better himself and they will find automobile trade papers a great help.

"With the right kind of goods, well organized selling forces and good service you will undoubtedly increase your volume of business and increase the business of your dealers. This increase means lower cost and reduction of cost means higher profit. Volume is what makes big profit and the best illustration

I can think of is the Ford Motor company.

"A short time ago, on account of taking on war work and reducing their output to about 50 per cent., they had to increase their selling price \$93 per car, which means an increase of 24 per cent., just think of it. The same condition applies to your business. If you can make your volume great enough you will be on the same basis as Ford, who only had a very small overhead per car. Consider that today their increased overhead must be at least \$80 per car. Of course we realize that you must have the right percentage of profit to start with, but there is only one way to increase that profit and that is by reducing your cost through volume.

"What are we offering to the jobbers with the AC spark plug? Positively the best spark plug in the whole world today. The reason I can state that is because we know that on comparative tests with foreign makes of plugs an aviation motors we stood up better than any other make of plug in the whole world. It doesn't make any difference what the AC plugs has been put up to do it has done it—airplanes, tractors, automobile motors of all types. We not only made good on aviation, but we are really the only people today who have made good on tractors using kerosene as fuel. The new AC carbon proof plug was made for Henry Ford and Son and is used today on their tractors. The AC line consists of our regular AC, AC Cicco, AC Titan and AC Carbon Proof. If you take advantage of the full AC line you can show the dealers that put in a complete stock they are in a position to take care of all customers and all types of motors. The question of carrying the right stock is just as important for the dealer as it is for you, as in getting them to carry a complete stock of the best lines you are making it possible for them to take care of their customers. You are giving them goods that move and make money. You are making them a good credit risk because you are helping them to become successful accessory dealers. The dealers need your advice and those who are willing to accept it do so because they have confidence in you. If they have confidence in you you should justify it by giving them the right kind of advice and keeping that confidence."

SPECIAL POSTAL EXPORT LICENSE FOR REPAIR PARTS.

The War Trade Board announces that there has today been issued, through the postal service, a special export license, No. R. A. C.—50, authorizing until April 15, 1918, the exportation through the mails of repair parts for agricultural implements to Great Britain, France, Italy or Japan, or their colonies, possessions or protectorates. This will permit shippers to send to the countries indicated until April 15, 1918, through the mails, such repair parts to agricultural implements without securing individual licenses for the same, as has heretofore been necessary.

New York Will Have Over 500,000 Cars

If Present Rate of Registration Is Maintained in That State Half Million Mark Will Be Reached.

New York state will have a half million motor vehicles by the end of this year if the present rate of increase in registrations is maintained for the next few months. Not only have all the figures been smashed in the automobile bureau, but requests for original registration blanks indicate a heavy buying of new cars totaling several hundred daily.

February, 1917, was the biggest month in receipts in the history of the state's motor vehicle bureau. \$945,000 having been collected from the registration of cars and the licensing of chauffeurs.

The New York City bureau has already taken in \$1,600,000, or within \$500,000 of the entire amount collected during all of last year. Records of the Albany bureau clearly demonstrate the increased registration along all lines. Comparative figures show that 59,379 cars were registered in that zone of 30 counties up to March 30, an increase of 17,111 over a like period last year, while the increase in revenue this year amounts to \$145,222.

An average daily increase over last year of 336 cars have been shown in the face of weather conditions that until recently have been of unusual severity.

Comparative figures covering the registration and receipts of the entire state show a gain of 19,293 cars over a year ago and with increased receipts of \$191,352. All told 225,685 cars have been registered this year, with total receipts of \$2,384,877.

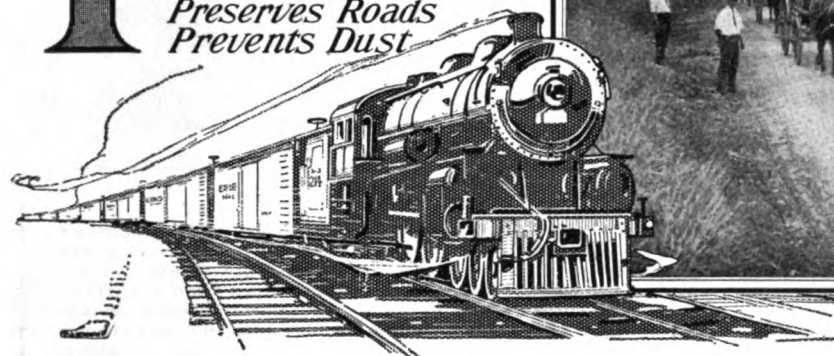
BIG DRIVE-AWAYS FROM THE PACKARD FACTORY.

More than 12 per cent. of its cars and 21 per cent. of its truck deliveries since Dec. 1 have been made by the Packard Motor Car Co. to its branches and dealers via the drive-away method. These percentages represent either so much relief to the railroads during this period or just so much more business which could not have been done if the drive-away had not been adopted. These figures take no account of the hundreds of United States Army trucks which travel to the seaboard under their own power.

"When it is recalled that this achievement was made in the depth of a very severe winter, with the roads frequently choked by drifting snow, the feat reflects credit on the drivers, the dealers taking factory delivery and the vehicles that made the run," said George R. Bury, assistant general sales manager of the Packard. "In some instances trains of nine Twin Sixes and 30 trucks traveled 570 miles over wintry roads."

Tarvia

Preserves Roads
Prevents Dust



The Roads Must Help the Railroads—

PRECIOUS shipping is waiting in the harbor because cargoes are clogged on the railroads. Factories are laying off their labor and closing because they cannot get raw materials through the railroad embargoes. The whole internal commerce of the East is in a snarl, and it will be so intermittently till the end of the war and after.

Parallel with every railroad run the public highways. They are *not clogged* with traffic.

But they *are clogged* with mud or with neglect in various sections of the through-routes and the great swarm of motor-trucks traverse them slowly and with difficulty.

Clear those roads, the nation needs them!

Make your town, your county, keep up its part of the great arteries. Don't let your locality be the weak link in the chain where an impassable mile puts the whole interurban route out of commission.

It is no time to be building roads for mere beauty or comfort.

It's no time to tolerate poor roads that might be easing the overload of the railways.

Such roads call for labor and materials that are needed elsewhere.

Build and treat your roads with Tarvia.

In England and France that is just what they are doing: making their roads last longer by tarviating them on a greater scale than ever. They figure that it saves labor which is scarce and public money which is scarcer.

The Nation's plea to our local governments to refrain from public works that can wait till the end of the war does not apply to roads.

Roads were never so vital as right now. They will help us win the war.

The *Barrett* Company

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh Detroit
Birmingham Kansas City Minneapolis Nashville Salt Lake City Seattle Peoria
THE BARRETT CO., LIMITED: Montreal Toronto Winnipeg Vancouver St. John, N.B. Halifax, N. S. Sydney, N. S.

©
Central
News



Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by any one interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will have prompt attention.

PHOTOS ABOVE ARE

Top—Troop movement over Tarvia-treated Government Post-Road, leading from Fort Sam Houston, Texas.

Middle—Military truck-trains need Tarvia roads for efficiency.

Bottom—Tarvia-built road, N. Main Street, Providence, R. I.



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**NEW DEPARTURE
BALL BEARINGS**



Strength
Stamina
Service

The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensee

**ZENITH
CARBURETOR**



KNOWN the world over as the *zenith* of carburetor efficiency. A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.
New York Detroit, U.S.A. Chicago

**The Accessory and
Garage Journal**

\$2 the Year, 20 Cents the Single Copy.

The only American publication devoted exclusively to the Power Vehicle and Allied Industries and Trades. A guaranteed circulation of 25,000 copies to trade interests only.

Address all communications to the

TIMES BUILDING
Pawtucket Rhode Island

Polarine

THE STANDARD OIL
FOR ALL MOTORS

Standard Oil Company of New York

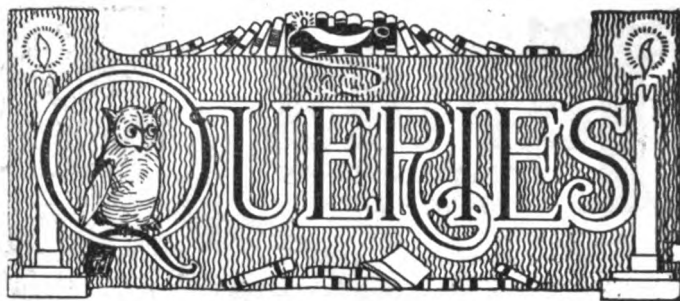
PAIGE

It is a well-known fact that Paige Dealers are among the biggest money makers in the motor car field. An inspection of the Paige line will explain why.

Write for complete particulars

PAIGE-DETROIT MOTOR CAR CO., Detroit, Mich.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

WHAT ACCESSORIES ARE YOU USING THAT HAVE IMPROVED THE UTILITY OR CONVENIENCE OF YOUR CAR?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 5th of May. The contest is open to every one.

EXTRICATING THE CAR FROM A MUD HOLE.

(R. L. Prindle, No. Abington, Mass.)

Best Letter.

"Old Man Winter" having delivered his final blow, in his wake are found to be countless mud holes, that in many cases seem to be bottomless or nearly so. No permanent relief can come from the mud evil until nature itself settles things with a number of good rains with lots of sun and wind. Until that time arrives the chances of one's car becoming mired are very great. In fact, the writer much prefers getting stalled in snow drifts rather than in mud holes, for in snow one can shovel, while deep mud shoveling is entirely out of the question.

Ninety per cent. of all the cars stuck under these conditions have an abundance of power, but power is almost useless unless traction can be supplied to the rear wheels. Until this is done no one could hope to get a car out. Generally the rear of the car is down deeper than the forward part, due to the spinning of the wheels and the greater weight.

Secure some boards, planks or railroad ties and if possible place one of these lengthwise under the rear axle just inside the wheel. The car's weight will rest upon a jack that is placed upon the plank. A small board will not do as it would sink out of sight with very little weight upon it. Operate the jack until the wheel is entirely free from the mud. Into the hole from which the wheel is pulled throw stones and then place a plank over the filled spot and let down the jack. The other wheel is raised the same as the first and the process repeated, care being taken to get both wheels level so that they will not slip or flop from the planks when the car rolls over them.

Examine the front wheels and if down very deep it will be necessary to have these on a good foundation because they

will stall the rear wheels when power is applied and may result in slipping off the boards that were just put under them. If necessary lay a track or runway with boards or branches placed crosswise over the ground that the car intends to pass over. Start the engine and with the low speed engaged drive slowly over this improvised road. This method of extricating a deeply mired car will prove highly successful in the very worst mud hole. A very good plan when raising the rear of car is to build up so as to produce a little momentum to help the engine start the car. Again a car can pull itself out of a small ditch by tying one end of a rope to a tree on the opposite side of the road, the other end being tied to the hub on the rear wheel. Care should be exercised to have the rope parallel to the car so that the car will not swing around when the power is applied.

Quite often help is offered by a passing car, but if in very deep a motor truck is the only real help, owing to its great weight, combined with a big gear reduction. The truck on solid ground will rescue the car nine times out of 10. The light touring car has not sufficient weight on the rear axle to obtain the desired traction.

Several devices on the market designed to extricate mired cars possess considerable merit, one especially that consists of planting what is known as a "dead man" firmly in the ground while two more metal stakes are driven in leaning towards the car. With suitable cable and metal block with gear reduction, which enables great power to be produced at the point where a hand operated crank is turned. It is a good plan to carry a device of this kind packed away in the car, which will prove very valuable in case of becoming mired.

EXTRICATING THE CAR FROM A MUD HOLE.

(C. S., Barningham, Providence, R. I.)

Second Best Letter.

The slogan of all states today is good roads. Roads built for traveling in winter, as well as in summer. Because of congestion in the railroads this slogan for good roads has been more of a national issue than ever before. But there are places where these good roads will not reach and it is there, where the motorist must prepare himself with necessary knowledge of how and what means to employ in getting out of the mire.

No motorist, however careful and experienced, can tell when he will get stuck in the mud, skid into a ditch or overturn. Such accidents come suddenly without warning, generally when he is miles from help and on roads that look perfectly safe and sound.

In places where mud or sand is not so apt to be very deep the writer has used and always carries with him newspapers. Newspapers have been proven by motor experts as one of the best of helps. Jack up the rear wheels and lay the paper, about three pages thick, underneath the wheels and continue this method until a road is built of paper 10 feet or more long. Start very slow in first gear and continue to move slowly until the car reaches solid ground. The paper thickness can be varied to meet varying road conditions.

In deep mud the car must have a road built of a more solid formation than paper. The best road would be one of plank, fence rails or stones. The writer would advise that the permission of the owner of these various objects should first be considered before taking advantage of same, as this situation would bring about more trouble than mud. If stones or fence rails are not available the use of twigs, branches or limbs of trees and sod work very well. Sand or gravel, if available, will under some circumstances serve to obtain traction.

There are a number of good devices on the market for helping to reclaim the motor car from mud, deep sand and ditches.

One is a mud hook, a small article, which is fastened around the tire the same as a non-skid chain, but unlike the chain which digs into the ground, it lifts the car out. This device can be attached or removed in a minute's time. It is light and occupies small space in the tool box.

Another device consists of a winding drum, lever crank and a steel cable with two chains and three stakes. This device also can be used as a tow line and a rescuing device, two things that every car should have.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

EASE THAT STRAIN



with

a

COMFORT FOOT REST

Give your foot the same fair chance your hands have, of being comfortable: a Comfort Foot Rest does it!

Your hands don't get tired because you can **rest** them on the wheel; but there's a lot of leg and foot strain that you've **had** to take—heretofore. The rigid position on the accelerator gives no rest.

With the Comfort Foot Rest it's different. "The Comfort pays by the foot—every single yard" you travel." Insures an even flow of gas; abolishes muscle weariness.

\$2.00

Order through your dealer, or we will send you one of these foot rests upon receipt of \$2.00.

THE GENERAL APPLIANCE CO.

102 Boylston Street

Boston, Mass.



Stop!!

If you are aiming for New York why not strike the center? This is where the **HERMITAGE** is located.

In the middle of the Times Square district. The **HERMITAGE** touches elbows at once with the great amusement and business centers of the metropolis.

Room with adjoining bath \$1.50 up

Room with private bath \$2.00 up

FRANK C. HURLEY, Proprietor.

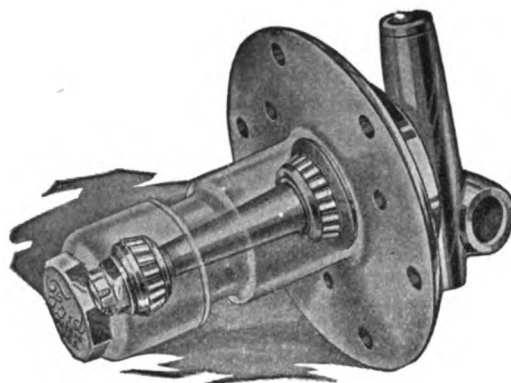
The chances are 4 to 1 that the bearings in your Ford front axle won't last 12 months. Why not anticipate the troubles bound to come through poor alignment and install Wright Taper Roller Bearings to prevent these troubles?

These unique roller bearings are identical in design with those used on the highest grade passenger and commercial vehicles. They'll outlast your Ford and will absolutely prevent misalignment of the front wheels and excessive tire wear. The use of demountable rims crushes the present Ford bearing. Wright Taper Roller bearings will carry this additional load. There's no difficulty in installing them as they fit the Ford without any changes whatever.

Price, \$10.00 per set

(4 Bearings)

In Canada, \$15.00



Wright Taper Roller Bearings Installed on Ford Front Spindle.

Dealers write Dept. M for proposition and details.

NATIONAL BEARINGS SERVICE CO.

WRIGHT TAPER ROLLER BEARINGS

Replacements for all Standard types of Bearings

723 N. Broad Street

Philadelphia

BACK FIRE IN MUFFLER.

(P. Y. H., Yonkers, N. Y.)

I have a 490 Chevrolet, 1917 model car, and am troubled with explosions in the muffler, or back fire. If I quickly remove my foot from the accelerator the explosion occurs. What is the cause of this and how can it be remedied? If you advise me on these points I would appreciate.

Muffler explosions are attributed to the fact that in the muffler is an unignited charge from a previous stroke of the engine where the charge has not been fired in the cylinder. This trouble may be traced to a number of things, such as the mixture being too rich, from electrical troubles, weak batteries or a poorly adjusted coil.

There must always be a sufficient flow of gasoline into the carburetor. Too late a spark and an open throttle will cause back firing. Examine the auxiliary air valve and see that it does not open on low speeds. If the spring is too weak it will give trouble. Perhaps the valves are not timed correctly. If the mixture burns too slowly it will operate the same way and will fire itself. Are you sure that your inlet valve does not open before the closing of the exhaust valve?

See that there is no dirt in the spray nozzle of the carburetor, open the gasoline adjustment and race the motor and it will pull through if this is the case. Try feeding a little more gas and if this does not remedy the trouble, look for carbon deposits. Back firing means that the mixture is burning on both the inlet and exhaust strokes.

CLEANING OILING SYSTEM.

(B. H. S., So. China, Me.)

Kindly give me information as to cleaning the gasoline and oiling system of the automobile. How often is it advisable to change the oil, etc?

To keep the gasoline and lubricating systems on an automobile engine clean is a factor that has much to do with efficient and smooth operation.

It is advisable to drain off the oil in the crank case every

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500 miles and to replace with the best grade of light oil obtainable. During cold weather oil loses its lubricating qualities faster than in warm weather, due to the fact that when the engine is cold a certain amount of the gasoline mixture on coming into contact with the cold cylinder walls is condensed and trickles down into the crank case, thus thinning out the oil. Possibly a small quantity of water or sediment collects in the bottom of the crank case. This may be removed by unscrewing the drain plug in the bottom of the crank case. When it is necessary to drain the crank case completely, as for changing the oil, it is advisable to thoroughly rinse the crank case with kerosene to clean it.

Remove the drain plug at the bottom of the gas tank about every 500 miles to remove any water or sediment that has precipitated to the bottom, as if this is not done, sooner or later it will be drawn into the gasoline line and find its way to the carburetor, thereby causing complications later.

PURCHASING A USED CAR.

(V. W. J., Lowell, Mass.)

Wishing to buy a second hand automobile and being a new comer to the field, I know that the expression "as is" covers a multitude of sins. Would you please advise me through the "Queries Column" of the Automobile Journal, or by letter, the safest and best way to diagnose this problem satisfactorily to future economy.

Buying a second hand car is not unlike purchasing a cigar, for the quality of either article is not readily visible.

The engine can be fixed, the gears silenced and a new dress of paint will "doll up" the old wagon so that an unskilled purchaser is easily deceived. However, good second hand cars are very hard to get and always command a good price.

Buying a car "as is" from the owner who is purchasing a new car is bad business unless one knows the history of the car, the trials and tribulations it has been through and the amount of care its owner has given it. A car that has been operated a year by a careful owner that has been prop-

erly looked after, kept in the best mechanical order and repairs made when needed is but little inferior to a new one. The bearings will have worn to a good fit and it will have practically more power than one that is new. The value of such a car is usually beyond its second hand price. With a little overhauling and a good job of painting the result will be very satisfactory.

Agencies of new cars take used cars in part payment, overhaul them to some extent but usually sell them with no guarantee. The dealer that makes a business of selling used cars most always overhauls them himself or has it done elsewhere and has a reputation at stake, so his statements regarding a rebuilt car are usually acceptable for their full value.

No matter where the car is purchased it should be gone over very carefully. A demonstration is usually given and this most always consists of a short run around the block and perhaps a short spurt up some hill. The performance of the car if it shows power, ease of operation, etc., is sufficient to satisfy the average buyer, but the experienced buyer goes a long ways further.

The engine should be tried out for compression. It should be run at various speeds with an ear towards knocks. The lights and ignition system should be tried out and these questions should be settled: Does the starter crank the engine? Is the oiling system working properly? Take off the gear case cover and try out the various speeds to determine if they click or are sheared off at the corners of the teeth?

Jack up the rear wheels and test for lost motion with the gears in mesh. Pull on the emergency brake to find out if each wheel turns with the same resistance. Rock the wheels to find out if the bearings are worn. Examine the tires carefully. Note the condition of the top, but best of all take an expert mechanic with you and do things up systematically. It will pay you in the long run.

SQUEAK IN GENERATOR.

(G. F. R., Perth Amboy, N. J.)

There is an annoying squeak in the generator of my Oldsmobile 1917 model No. 45, the noise caused, I believe, by the commutator.

Two different garage mechanics have lightly used fine sandpaper and emery paper on the commutator, which eliminates the squeak for a very short time. I drove the car over 100 miles yesterday and the noise was aggravatingly in evidence for most of the time.

Can you determine the trouble if it is other than the commutator and in any case advise as to a permanent remedy?

This noise is probably due to one or more of the commutator brushes. Try lifting off one brush at a time (providing this does not open the circuit). Find the brush which makes the most noise and readjust the tension, seeing that the brush holder allows for proper play. Apply a little vaseline with the finger to the commutator while running. Be sure that brushes are set at correct slant for the direction of rotation of the armature and that they fit the curvature of the armature. This curvature can be obtained by holding a strip of sandpaper firmly on the armature and turning the armature back and forth, letting the sandpaper wear down the brush. The brushes on a new car always squeak more or less at first, but this should stop after running a day or two.

Use a fine grade of sandpaper, but never use emery cloth for the dust and particles from this combination are liable to get into the segments and pores of the copper, thus eating their way to serious damage.

CARBURETOR TROUBLE ON TWIN SIX.

(R. L., Overbrook, Pa.)

I take the pleasure to ask for a little information in regard to carburetor trouble.

I have a Packard 1-25 Twin Six and this car has a habit of stalling in slow speed, especially in slowly moving traffic. I have tried all the adjustments on the hand wheel and have also tried adjusting the spring on the air valve, but with no success at all. The carburetor has been thoroughly cleaned and I have taken this car to a Packard shop.

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Higher Cost—But

The slightly higher cost that the car maker pays for Bosch Magneto ignition is returned threefold to dealers.

The dealer needs no time to explain why he hasn't fitted Bosch—America's Supreme Ignition—and his time for "free" ignition adjustments is cut to the minimum.

Also, the engine lasts longer, and serves better.

Be Satisfied.

Specify Bosch.

BOSCH MAGNETO COMPANY

MAIN OFFICES: 204 W. 46TH STREET, NEW YORK
BRANCHES: CHICAGO DETROIT SAN FRANCISCO

Works and Foundries: Springfield, Mass.

MORE THAN 3,000,000 BOSCH MAGNETOS IN USE



MINUTE DEMOUNTABLE WHEEL

for Ford Cars

It's the biggest seller of the year, because it fills the greatest need.

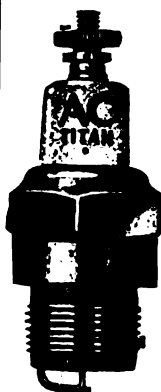
Changes a tire in 60 seconds. One nut to unscrew that's all you do.

Retail Price - - \$30

Denver and west \$35

HILL-SMITH METAL GOODS CO.

82 Brookline Ave., Boston, Mass.



Reg. 3/8-inch
Titan

Albert Champion Means AC Spark Plugs

The Standard Spark Plug of America

LOOK FOR AC ON THE PORCELAIN

PERFORMANCES, not claims, are what count. AC is exclusive equipment on NINETY makes. There is an AC for every type of motor.

SOLE MANUFACTURERS

Champion Ignition Co., FLINT, MICHIGAN

Smart—Easy riding—Well built

The roomy bodies of the new Elcar models are designed along graceful, distinctive lines. Here is a car with **character**. It is easy riding under full or partial load. Drive all day and you won't be cramped. Plenty of elbow and limb room. Abundant power for hard pulls. All the speed you want. Fine driving qualities at all speeds. Built-in quality that insures good service for years.



Brief mention of ELCAR points:

Four-cylinder models, 37½ horse power at 2100 r. p. m.
Six-cylinder models, 40 horse power at 2100 r. p. m.
Two unit electrical system.
Long wheelbase, 116 inches; road clearance 10½ inches.
Full floating rear axle with spiral bevel driving gears.
Timken Roller Bearings front and rear. Double universal drive; tubular propeller shaft.

A wonderfully easy riding semi-elliptic spring suspension. Roomy and comfortable bodies of beautiful design and durable finish, new "Cathedral Pipe" upholstery. Equipment complete, even to motometer.

Write for Catalog

Get all the particulars on the Six New Elcar Models—two Roadsters—two Touring Cars—two Sedans.

Dealers

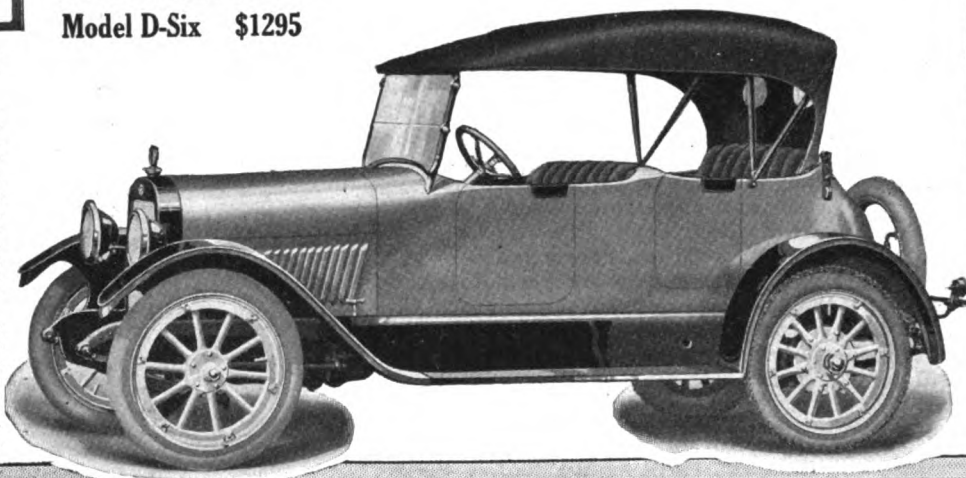
Our increased output enables us to offer this fast selling car to a few more dealers.

Elkhart Carriage & Motor Car Company

C-811 Beardsley Avenue, Elkhart, Indiana

Model D-Four \$1095

Model D-Six \$1295



The carburetor trouble you experience may be due to the fuel level being either too high or too low. Suggest that you have your carburetor thoroughly adjusted and tested while going over the road, as this is the only practical way of getting a satisfactory adjustment.

Conditions differ in traffic and when moving very slowly through traffic the sudden application of brakes tend to make the fuel surge up at the jet in front of the carburetor chamber thus giving probably too rich a mixture to accelerate quickly upon pushing down the accelerator.

The operating conditions of the carburetor when the engine is running slowly is affected by the varying surfaces of the roadway, which fact makes its operation less certain then when the engine is idling at a corresponding speed when the car is not in motion. Evidently you attempt to run too slowly without shifting into low speed.

INSTALLING LARGER CARBURETOR.

(G. A. G., Woonsocket, R. I.)

I have a Scripps-Booth, early 1915 model, rated at 14 horsepower, equipped with a 7/8-inch Zenith carburetor, and would like to know if it would be an advantage to substitute a one-inch carburetor. What would be the style and make that you would advise me to use?

Also concerning storage battery, I wish to know if it would be advisable to have this battery repaired and if it would give satisfactory results once repaired.

We do not believe that you will be benefited by changing the carburetor on your Scripps-Booth car. While you might get more power at extreme speeds, there would be an unnecessary waste of gasoline at other speeds. It would be very expensive to install a new carburetor, as this change would require in addition a different type of manifold. This change would not be practical, although you might secure more power due to atmospheric conditions in summer, but your trouble would again develop in cold weather.

The Williard people guarantee their work and will advise you as to the condition of your battery.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

SHORT CIRCUIT TROUBLE.

(E. E. H., Fishville, Mass.)

I am driving a Buick B-25-1914. Have driven it about 27,000 miles and it has always given me excellent satisfaction until recently. I am having some trouble and will explain to you as near as I can as to how it acts and if you can offer any suggestions I shall very much appreciate it. The car is equipped with the "Delco system," and at times the car refuses to run on the "M" side, but will run in the "B" (dry cells), then after a few minutes will run all right again. Then at times the horn and lights almost go down and then come up again strange. This might indicate a low storage battery, but I have just installed a new battery, and it acts just the same. I have also had a garage man take out all the wiring to see if there is a "short," but he can find nothing wrong. I have thought possibly there might be a "short" because in working under the car I would get a shock in the generator. Would this be likely to be any trouble with the coil?

We have exhausted our search and if you can offer any suggestions I would very much appreciate it.

From the description of your troubles we believe that these conditions are due to a loose connection somewhere in the lighting circuit.

Look for this trouble at one end of the wire from the generator terminal to the fuse box. It may also be traced to bad contact or an intermittent ground. For example, a contact might be just loose enough so that a slight vibration would cause the circuit to be made and broken repeatedly. A grounded wire might also cause the same demonstration by continually making and breaking the ground connection. Every time the ground is touched the lights go out because the current flows through the ground instead of the lamps. The trouble may be roughly estimated by noticing whether all the lamps flicker or only one of them. If they all do then the trouble is in the generator or in the lines running from it, but if only one lamp flickers the trouble is in this individual circuit.

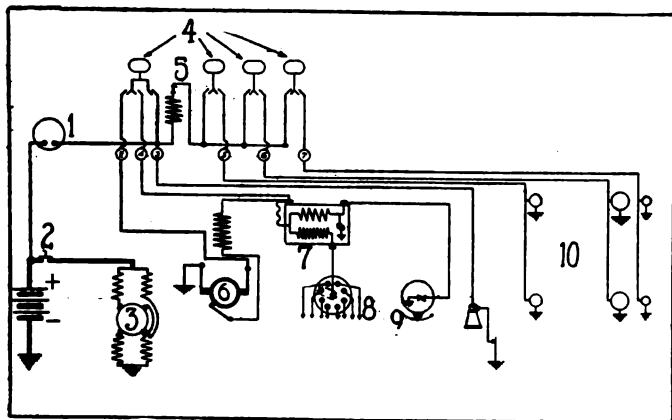
CUT OUT SWITCH.

(A. G., New York City.)

Will you kindly show me a drawing of the Delco system used on the Oldsmobile model 45. I would like to know how the cut-out switch works as all I can see of it is two little coils and a blade.

The combination switch is for the purpose of controlling the lights, ignition and the circuit between the generator and storage battery. The button next to the ammeter controls both the ignition circuit and the circuit between the generator and the storage battery. The button next to this controls the cowl and tail lamps. The next button controls the larger head lamps.

When the cut-out switch button is pulled out, the contacts are both closed at the same time. With this turned on the engine can be started. The dynamo will quickly generate a voltage high enough to cause battery charging, and the flow



Wiring Diagram of Oldsmobile 45: 1, Ammeter; 2, Starting Switch; 3, Starting Motor; 4, Ignition and Lighting Switches; 5, Generator Cut-Out; 7, Ignition Coil; 8, Distributor; 9, Timer; 10, Lighting Circuits.

will take place from the dynamo to the battery. Part of this dynamo current will then pass through the ignition contacts of the switch and will take the place of the battery current supplied while starting the engine. One side of the battery and one side of the dynamo are grounded so that the charging current is completed. When the engine is to be stopped the switch is opened by pressing in on the button and both the ignition and charging circuits are broken. The dynamo is then disconnected from the battery while the engine remains idle.

(Continued from Page 26.)

the brakes. This surplus oil or grease is run off through a drain tube which projects from the inner side of the brake flange underneath the axle tube. Much care should be taken to see that these tubes are always free and open.

After removal of the nuts and key upon the hub wheel hubs may be withdrawn, bringing the driving shafts with them. The differential cover plate is next removed, exposing the differential assembly. This assembly is carried on roller bearings which slip upon the shafts. Removal of these units permit the removal of the differential assembly with the races and bearings. Upon replacement of these units a careful adjustment should be made. Turn up the adjustment sleeves which carry the bearings on which the differential is mounted. Both sleeves must be turned to the same amount in the same direction to prevent any end play in the differential bearings. The differential case should be scrubbed with gasoline.

The steering screw on the steering gear is provided with a ball thrust bearing and adjusting nut at its upper end for the purpose of taking up any back lash or lost motion in the steering wheel. There should not be more than one inch of play in the wheel.

If wear has taken place in the external brakes the brake lining can be taken up by adjusting the thumb screws and

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The Cheapest-in-the-end Lubricant

is the one that gives fullest service for the least cost per month—not per pound.



is cheapest in the end because it gives the fullest lubrication service throughout the year—it does not freeze or harden or melt or leak out. It does not need heat to make it start lubricating. It lessens friction, reducing gasoline consumption and repair bills.

NON-FLUID OIL actually costs less per month than common grease because it lasts three times as long.

NON-FLUID OIL is made from the finest mineral oils by our exclusive process—insist upon the orange can with our trade mark—your dealer has it.

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A magazine for business men devoted to the promotion of highway haulage efficiency. It is the national authority of vehicular transportation.

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The highest quality lowest priced lamp produced

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THE SYSTEM INCLUDES:

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Coes Wrenches do not break, or wear out in service life, they cost less than any other tool made.

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Automobile
LUBRICANTS

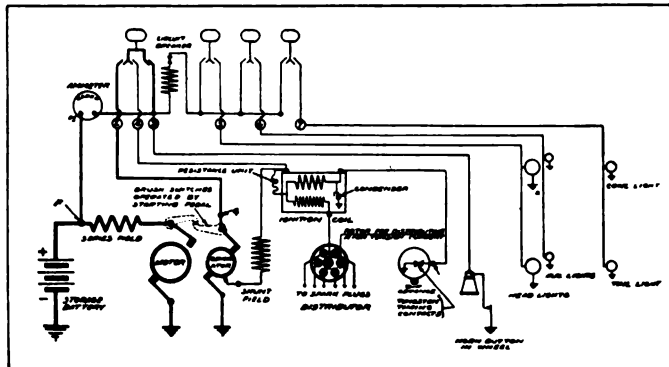
More mileage, more power, a quieter car, fewer visits to the repair shops are the results of using DIXON'S.

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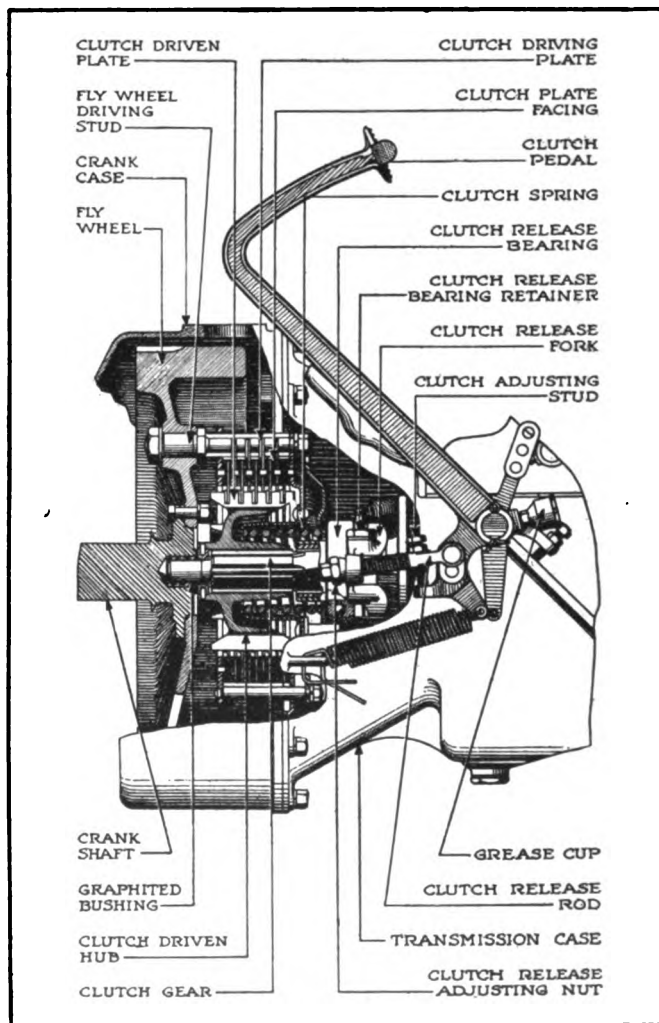
lock nuts at the opening in the bands and by means of the adjusting screws in the anchor pins in the rear. The bands should be adjusted just enough to allow a clearance of 1/16 of an inch between the lining and the circumference of the drum when the brakes are released.



Wiring Diagram.

The throw of the brake pedals can be adjusted by means of the turnbuckles in the brake rods. Be sure that the brakes on both wheels are adjusted the same amount. The emergency brakes wear very slowly and adjustments are made by shortening the rods with the turnbuckles.

To take up the end play in the driving yoke, adjust by loosening the clamp screw and turning the nut on the forward end of the tube.



The Multiple Disc Clutch.

The rear springs are attached on the rear axle by spring seats, which are free to turn on the axle tube. They are provided with felt pads and oilers that should be filled every 1000 miles.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

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this will be the last war

If We Lose

—It will be but the beginning of wars upon wars, a holocaust with slaughter, famine and unspeakable horrors.

The issue is plain. It is up to you. Either sacrifice now or make the supreme sacrifice later.

SAVE NOW, BY PLAN, TO BUY

THIRD LIBERTY BONDS

LIBERTY LOAN COMMITTEE OF NEW ENGLAND
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Nearly a Million FORDS on the Road

Help KEEP them on the Road by Using

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And Special Tools for FORDS



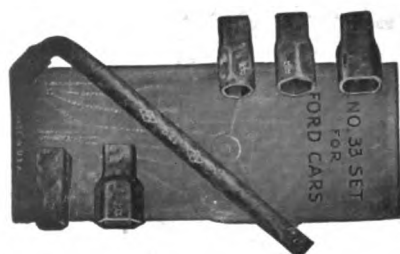
No. 17 Set—Heavy duty for Ford. 10 sockets, including those special sockets for spark plug, rear axle housing and cylinder head nuts. Price each, \$2.00.



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AUTOMOBILE JOURNAL

DEVOTED TO

OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS

VOL. LXV.

PAWTUCKET, R. I., APRIL 25, 1918.

NO. 6.



Look for this silent salesman on your tire dealer's counter—and learn

The "WHY" of the Hood "EXTRA" Ply

We shall tell you in a series of advertisements in this space the reason "why" of the "extra" ply in Hood Tires.

Perfect tire service depends upon—1. Clean and perfect rims. 2. Proper style tire for rim. 3. Proper size tire for car. 4. Correct air pressure for tires. 5. Correct construction of tire.

The Hood Arrow Tread Tire contains an "extra ply" of fabric, made of a cotton having the longest fibre grown, insuring the greatest strength.

This fabric is so applied to the carcass that every yarn bears its equal share of the strain.

This "extra ply" increases the carcass strength from 25% to 35% over any tire of standard make and equivalent size.

That is why Hood Tires give more mileage at less cost and more protection from blowouts.

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Overland 79
Maxwell, 1916-17
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Hupmobile 1916-17-18
General Engine Overhaul
Packard Twin Six
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General Chassis Overhaul
Oldsmobile, 44-45
Chalmers
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Saxon
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Annual Overhaul Review AUTOMOBILE JOURNAL

May 25th Issue

The most comprehensive presentation of information dealing with the overhaul and restoration of models of popular passenger cars ever compiled.

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It will be the opportunity of the year. Reserve space by wire or letter. This will insure representation.

Last form closes May 5.

AUTOMOBILE JOURNAL

Times Building

Pawtucket, R. I.

Announcement to New England Dealers—

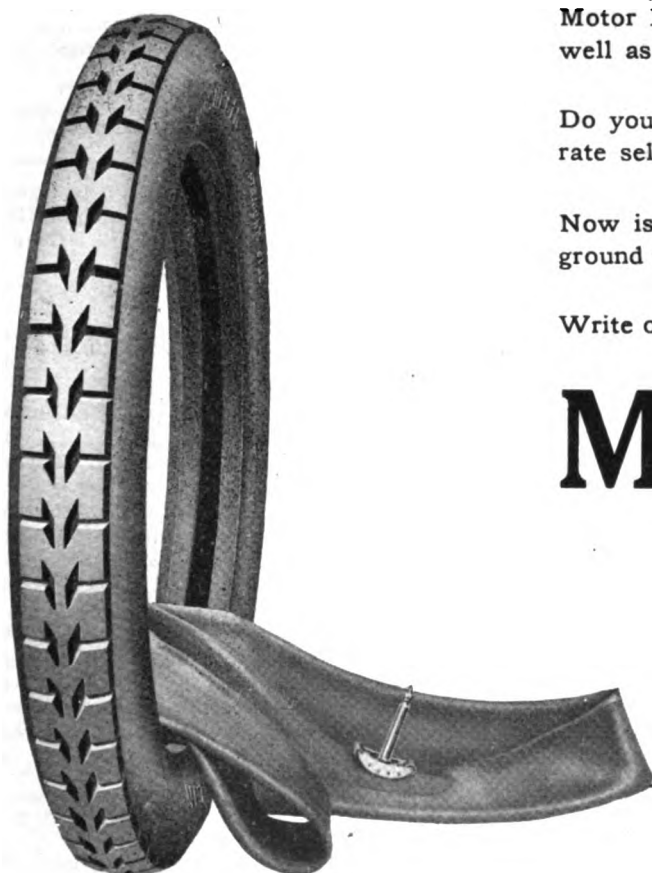
The Michelin Tire Company has decided on a concentrated sales and advertising drive in New England—reinforcing the national campaign which is already reaching practically all New England motorists through The Saturday Evening Post, Literary Digest, Life, Country Gentleman, Motor, Motor Life and other big national magazines, as well as through the leading trade papers.

Do you know all about Michelin's Quality, Moderate selling prices and liberal profit?

Now is the time, Mr. Dealer, to get in on the ground floor.

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are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

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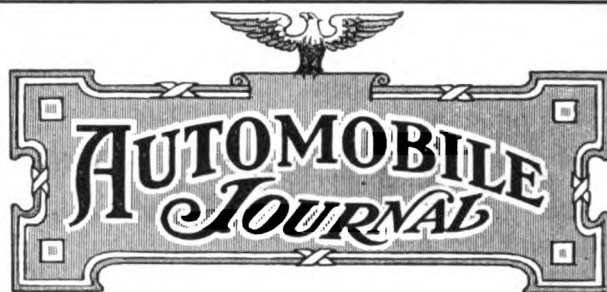
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It is free at request.*

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NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street



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This pump is made especially for Ford cars, is as efficient and simple in principle and construction as it is in operation; drive gear attached to crank shaft and no machine work or drilling required; our price, complete, \$2.65. BASCOM.

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4 NEW WHEELS, 5 Rims, 1 Spare
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These wheels are guaranteed first quality.

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We have the largest stock of Used Tires in New England to select from. We can make immediate deliveries from 1 to 100 tires of each size. Our enormous output enables us to quote lowest prices.

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28x3 .. \$2.75 & up	36x4 .. \$7.50 & up
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34x3 1/2 .. 6.00 & up	36x4 1/2 .. 8.00 & up
31x4 .. 5.00 & up	37x4 1/2 .. 8.50 & up
32x4 .. 5.50 & up	35x5 .. 9.00 & up
33x4 .. 6.50 & up	36x5 .. 9.00 & up
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35x4 .. 7.00 & up	38x5 1/2 .. 12.50 & up

10% Extra for Non-Skid.

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The real solution of the Headlight Problem.

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30x3 1/2	.. 3.75 up	36x4	.. 7.75 up
31x4	.. 5.00 up	36x4 1/2	.. 8.00 up
32x2 1/2	.. 5.00 up	37x4 1/2	.. 8.00 up
32x4	.. 6.50 up	35x5	.. 8.50 up
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31x4	...\$6.00	36x4 1/2	... \$9.00
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33x4	...\$7.00	37x5	...\$10.00

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Parts for any Automobile at a saving of 50% to 80%. Our three great plants cover every state in the Union, and we are therefore in better position to fill your orders.

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GREAT SLAUGHTER on Second Hand Auto and Truck Parts of all descriptions, including Magnets, Carburetors, Starters, Head Lights, Radiators and everything pertaining to the automobile. Consult us first and save yourself time and trouble.

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30x3 1/2 10.30	11.50
32x3 1/2 12.05	14.00
33x4 16.85	19.00
34x4 17.25	19.75
35x4 1/2 24.25	27.00
37x5 28.00	35.00

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Mail your order now and save 25% to 50% on your tire bills.

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And all other makes of Magnets repaired right.

Guaranteed Ignition Outfits
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AUTO PARTS—At Your Own Prices. We can supply parts for nearly every make of car. 648 Packards, Interstate Fours, also Truck parts, GMC and other makes.

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Actual Photograph of Wooden Separator used only Three Months, or One Quarter of a Year.

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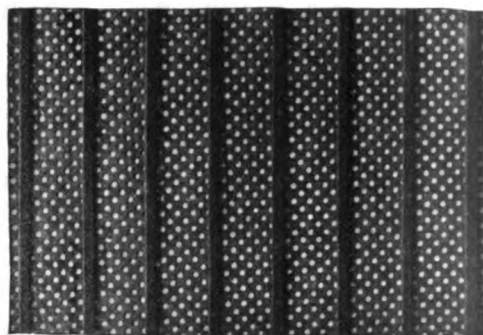
It makes no difference what kind of a battery you are now using we can take care of your

Repairs—Testing—Re-Charging

And when it comes to new batteries, see the Davis-Lynn to be convinced they are constructed along the right lines to insure long life without repairs or rebuilding.

J. R. JACKSON

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Tel. Back Bay 5182-M



Actual Photograph of Rubber Separator after being in Electrolytic Acid Seven Years.

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We have a dealer proposition that has never been equaled, offering the fullest co-ordination between the largest tire house and you the dealer. If you will write us your wants we will be glad to go into our plan with you.

We Carry at All Times the Largest Stock of Tires in New England. Write Us Today

GEORGE GROW AUTOMOBILE CO.

321-323 Columbus Avenue, Boston, Mass.

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TO ALL CAR OWNERS

PAINT YOUR CAR NOW!!

Here is your opportunity to start out this spring with a brand new looking car at little expense and small trouble—You'll enjoy yourself—and you'll be "doing your bit." Paint your own car—and now.

SIMPLE SYSTEM—three coat work—PERFECT RESULTS

ANYBODY CAN PAINT A CAR IN 3 DAYS

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The Three Coats Put Up in Sets Comprising:

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- 1 Can of Auto Preservative Varnish for Third Coat.

- 1 Brush for First and Second Coats.
- 1 Varnish Brush for Finishing Coat.
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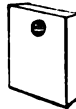
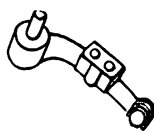
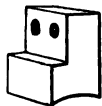
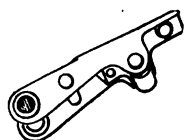
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JOURNAL

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Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under act of Congress of March 3, 1879.



EVERY owner of a motor car, garage men, automobile salesmen, accessory dealers, and, in fact, anyone who uses a machine or gains their living either directly or indirectly from the motor car industry will find in the May 25 issue of the Automobile Journal some of the most interesting and valuable data and information on the automobile ever published. It will be an "Overhaul and Equipment" number, subjects which are of more vital interest at present than ever before, as further curtailment in the production of automobiles is in prospect and thousands of people will be obliged to retain their old cars for use, a fact which will mean a more extensive business in overhauling and equipping cars in the next year than ever before experienced.

The chassis and working parts of the car will be thoroughly covered and instructions for a complete overhaul on practically all the leading cars will be given, including the Ford, Overland, Maxwell, Studebaker 4s and 6s, Dodge, Cadillac, Packard, Twin Six, Reo, Oldsmobile, Chalmers, Franklin, Saxon, Buick, Paige, Hudson, Super Six and Hupmobile, and also articles on General Engine Overhaul and General Chassis Overhaul. There will be an article on selecting the used car, giving information which will be valuable to many people during the coming year, as thousands will be obliged to obtain their cars second hand.

There is little doubt but that the used car will be the basis of a large percentage of all the business done in the automobile and accessory trade at the end of six months, and for this reason everyone should become as familiar as possible with the construction and maintenance of various makes of cars. With the great demand for mechanics to carry on the war work, it soon will be difficult to have repairs made promptly

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Treasurer . . WILLIAM H. BLACK

Secretary . . . D. O. BLACK, JR.

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WHILE fundamental economic conditions in so far as they affect the automobile industry are somewhat different in this country than in Europe, it is rapidly becoming evident that the war will exercise the same effect here on production and prices as it has abroad, although this influence might be exerted and felt to a lesser degree in the United States. With another cut in passenger car production, in contemplation, which curtailment is said to be approximately 50 per cent. of the normal production schedules of 1917, coming as it does in the face of apparently no curtailment in the demand, it is a safe prediction that even further advances in the prices of new cars will be witnessed than those already in effect. Such action on the part of the manufacturers is really compulsory, as it has been through quantity production alone that car makers have been enabled to sell automobiles at the very low prices at which they have been marketed for the past five years. When these extensive and well systematized plants and organizations are set to work on an output from 50 to 60 per cent. less than capacity, the overhead charges increase enormously and the cost per unit of production soars above the level obtaining when at full capacity. For these reasons alone higher car prices can be safely predicted and while they may not advance to the seemingly ridiculously and prohibitive figures attained in England, France and the other countries at war, they will necessarily be higher than anticipated. The used car will also reflect these influences and the higher values will make it profitable to fix up and restore every car that has any latent service possibilities and cars that formerly would have been consigned to the junk man. The price of tires has also been advanced.

PAIGE

The Most Beautiful Car in America

Paige Loyalty

This Company keeps faith with its dealers. This Company protects the interests and the investments of its dealers and will maintain their prosperity and prestige.

The organization, the mechanical equipment, the capacity of the Paige-Detroit Motor Car Company have undergone a tremendous expansion this last year. And that expansion will be still greater. We are determined to do all that, and more than our government, our owners and our dealers expect of us. We have set a high standard for ourselves and we are attaining it.

The work which the government has assigned to us has necessitated huge additions to the Paige factory. For the manufacture of Paige trucks we have already erected new buildings distinct from the mammoth main plant. We are making the largest possible production of Paige cars.

With Paige Trucks and Paige Cars this year we shall give Paige Dealers the most complete possible line, the largest selling opportunity, the greatest possible selling co-operation.

We shall be loyal to our country and loyal to Paige men.

PAIGE-DETROIT MOTOR CAR COMPANY, DETROIT

The Automobile Journal

VOL. LXV.

PAWTUCKET, R. I., APRIL 25, 1917.

NO. 6.

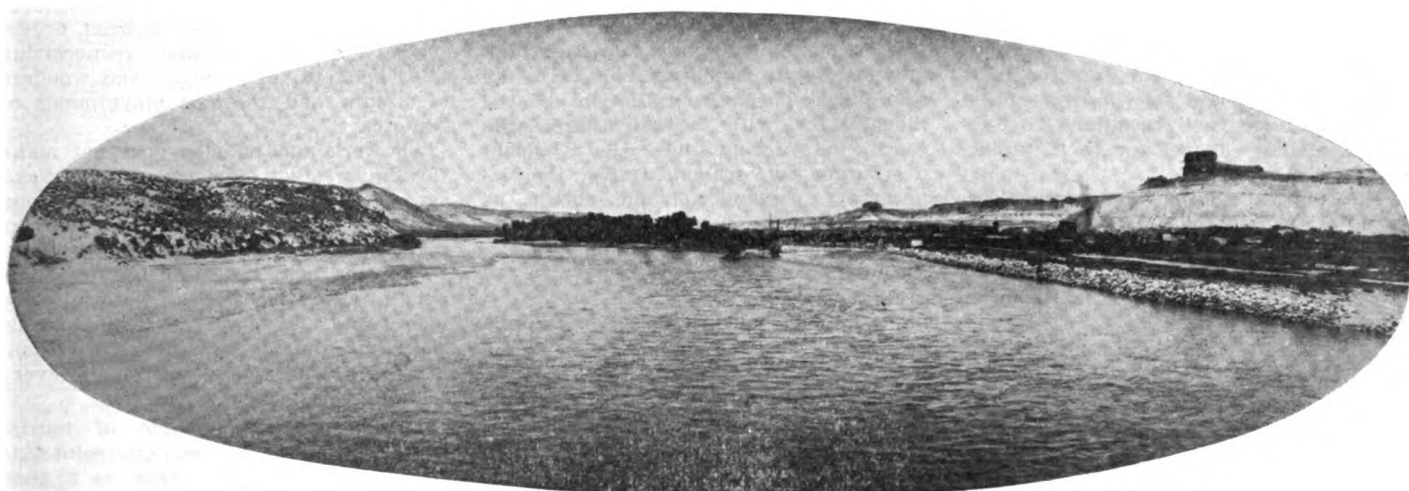
Over the Lincoln Highway

The Great American Tour

A Panorama of American Life and Scenery From the Hives of Industry in the East Through Nature's Vast Granary in the West to the Scenic Wonderland of the Pacific Coast

By A. F. BEMENT

Secretary Lincoln Highway Association.



Beautiful Scenic Spot on Highway Near Green River, Wyoming, Sweetwater County. Green River and Castle Rock on the Right.

With the first assuring warmth of spring signs are plentiful of the mobilization of a new army—a motorized army of American tourists which in the course of the present season will invade every region of that vast area bounded by the territorial limits of the United States. Preliminary preparations for taking to the road have been started by thousands.

Every indication points to an unusual amount of long distance touring in 1918. Certainly the volume of tourist traffic will be much greater than that of last season.

The season of 1917, our first year in the war, was the first season during which the volume of American touring as indicated by the statistics compiled along the Lincoln Highway and other

important through routes of tourist traffic did not double.

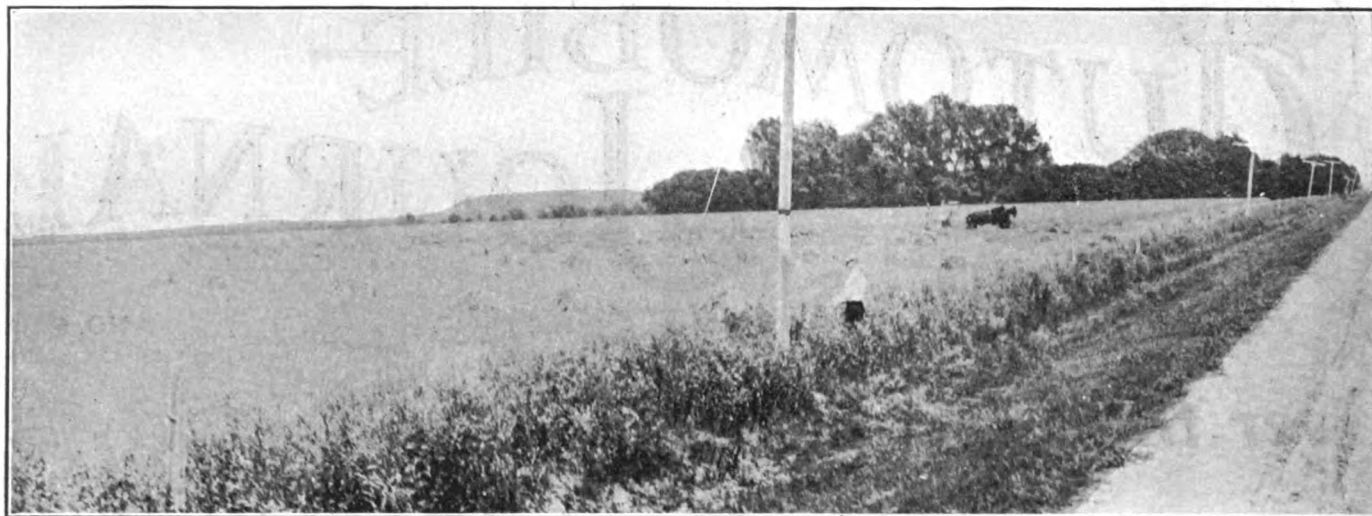
The total traffic in 1917 was about the same as 1916, and last year it was anticipated by many that this season would, for the first time since the development of the motor car, show a falling off in the amount of travel on America's highways.

It appeared likely for a time that there would be a serious shortage of motor cars due to factories being taken over by the government for the manufacture of needed war materials and due to a possible lack of materials for the manufacture of the automobiles themselves. However, the manufacturers have assured the public that a normal quantity of motor cars can be produced even while the factories are turning out in

addition everything required by the government, and that the supply of materials is equally adequate to provide for both the manufacture of the cars required and government needs as well.

Automobile manufacturers report an exceptional volume of retail sales to individuals contemplating automobile tours during the coming year and preparations are being made by the proprietors of hotels and garages along such popular and main traveled routes as the Lincoln Highway for a volume of business eclipsing that which they have ever before been called upon to care for.

The gasoline question at one time loomed as a formidable obstacle in the face of American touring this season. It has apparently been settled and an adequate supply at a price averaging no



Through the Great Wheat Fields in Nebraska Where Millions of Bushels of the Vital Cereal for Our Fighting Men and Allies Is Ripening.

greater than that paid a year ago assured for every need of both the American public and the government.

Last year the draft registration of the early spring made millions of men and families uncertain and unable to plan for the summer, not knowing what the chance of the drawing would reveal. This year that condition has passed. Those who have been called have gone and the careful classification of the questionnaire allows men of draft ages and their families to plan with more or less certainty for the immediate future. Thousands will undertake motor trips who last year could not, in view of the uncertainty of their positions contemplate extensive travel for their recreation period.

The concentration of hundreds of thousands of men in the scattered mobilization camps will in itself result in the planning and undertaking of long distance drives on the part of thousands of relatives and friends.

The country has, to a large extent, recovered from its shock of entry into war and thousands in every line of endeavor who have for a long winter been grimly sawing wood at their appointed tasks, plan a period of relaxation and an opportunity to increase their health and efficiency in the out-of-doors by a more or less extended motor trip to the mountains, lakes, beaches and parks, or every section of the land.

The average American of today is a motorist and the average American of 1918 in planning his vacation will think first of his automobile as a means of locomotion. There is patriotism in the thought for with the railroads of the country staggering under their present overburden of freight traffic, the unnecessary passenger traffic should be kept to a minimum to facilitate the handling of war needed commodities.

The luxuries of tourist travel by rail are under ban.

The motor vehicle can serve America

to good purpose this year in more ways than one, and while road improvement is being rushed on all main lines of communication to facilitate the passage of heavily laden trucks transporting war supplies for the government and short haul freight for the relief of our overburdened railroads, the misnamed "pleasure car," which has now been removed by the government from the list of unnecessary commodities, can be carrying American workers of all classes over these same roads on brief or extended revitalizing and reenergizing trips back to the beauties and wonders of nature and the vast playgrounds of America.

All work and no play does not make for the greatest efficiency or the greatest accomplishment. America's long distance motorists of 1918 will be gaining new health, vision and energy for a return to their tasks, at the least expenditure of necessary material and money and will be at the same time assisting in the maintaining of a normal and healthy business activity in every section of the land.

The tremendous volume of tourist traffic to which all indications point this season cannot but be taken as a good sign; good for the business of the nation; good for its health and spirit and morale; good in bringing about a closer understanding between widely separated sections of the Union and a correspondingly greater unity of thought and action.

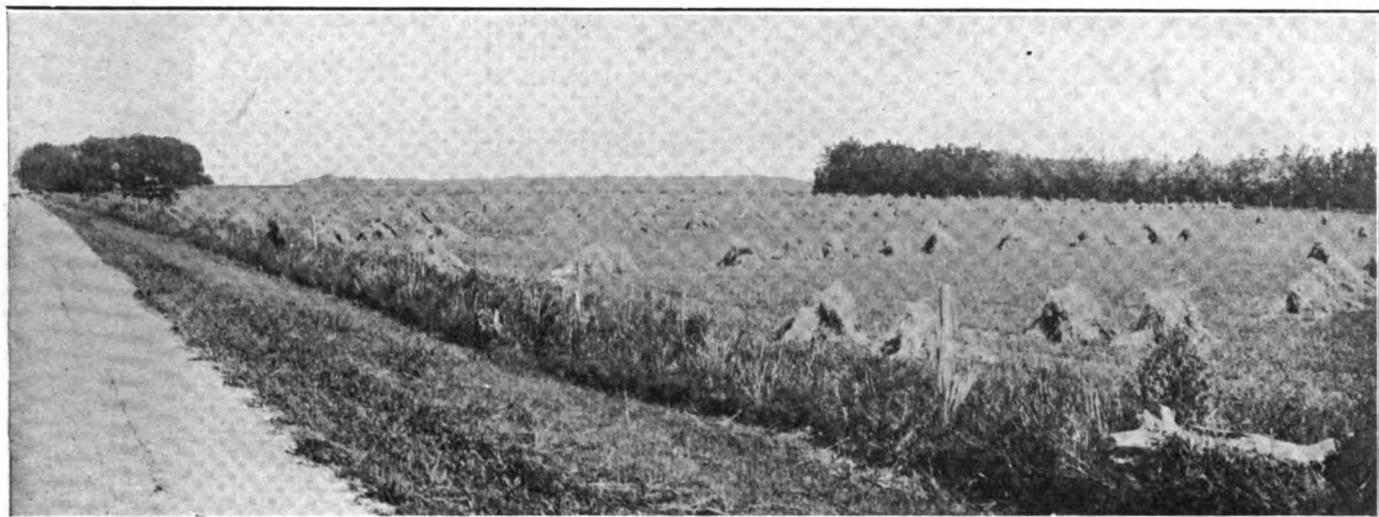
The transcontinental trip, affording a wonderful perspective of the widely varied charms of the East, Middle West and Far West, is still a favorite.

The transcontinental motorist of this year, or vast majority of them, will as usual follow the Lincoln Highway or portions of it and will be able to enjoy long sections of improvement primarily constructed, or being constructed for the transportation of government supplies, farm products and commercial freight.

What are the conditions to be encountered in a transcontinental trip on the Lincoln Highway in 1918? Not all good, to be sure, but infinitely better than ever before and destined to be made better



A Section of the Great Highway Running Through Pennsylvania, Showing Snow Removed Ready for Passage of U. S. Army Transport Truck Trains.



Nowhere in the World Today Are Good Highways so Important as in This Section as a Means of Getting to Market the Food Supplies That Will Win the War.

this year on a scale of improvement far greater than ever before undertaken, due largely to the urging of the Council of National Defense that the road be brought as soon as possible into the best shape made possible by the available funds in each state through which the route passes.

In November the Council of National Defense in a letter to the State Councils of Defense said in part: "With the constant increase in traffic across the country, the transcontinental highways are becoming increasingly important. Of these the most advanced is the Lincoln Highway. We ask your help to put it in first class condition. The Lincoln Highway, running from ocean to ocean, can be made a useful adjunct to railroad transportation. In good condition it is available for the movement of freight by motor truck. In particular auto vehicles destined for the use of the government or our Allies can be run over it to the seaboard on their own power and in so doing carry freight, thus making a considerable saving to the railways.

"We ask that you consult with your state highway commission and interest it and your local organizations to make whatever immediate local repairs are necessary to put the Lincoln Highway in useable condition and then to keep it so."

A tremendous program for constructive "linking up" of disconnected stretches of improvement is the result.

In 1917 approximately \$2,225,000 were spent in the 11 states through which the Lincoln Highway passes upon its improvement, less, however, than in any other one year since its announcement and dedication. Largely due to the urging of the Council of National Defense and the Federal interest in the improvement of the route as a main military strategic and commercial backbone highway, and with the Federal aid extended for the improvement of such highways, plans for 1918 indicate the expenditure of over \$4,000,000, or nearly 100 per cent. more than in 1917. Construction will be under way in many states, but in every instance good detour roads will be pro-

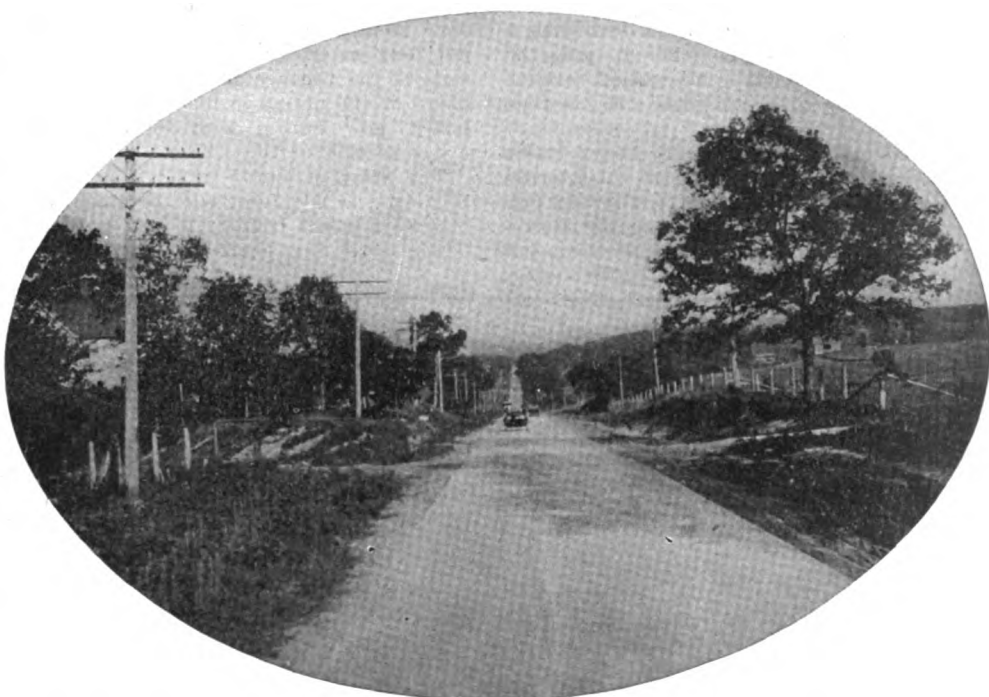
vided by the local authorities.

One cannot start out now for a trip across the United States anticipating boulevard conditions from coast to coast and it will be many a long year before such a motorist's millennium is realized. But one can start out with a definite knowledge of just how he is going, what the conditions are in each state, approximately the length of time the trip is going to take, what its cost will be, and can be very certain of arriving at his destination almost upon schedule time if proper care is exercised and the really very few necessary preliminary precautions taken.

The tourist driving the Lincoln Highway in 1918 should remember that many of the long stretches of perfect construction which he will pass over would have been a few years ago impassable bogs if wet or inches deep in dust if dry.

The Lincoln Highway across New Jersey is macadam in its entirety, but due to the tremendous traffic which it has carried this past winter, particularly the companies of motor trucks carrying government supplies from inland points to Atlantic coast ports, sections of the route have suffered rapid deterioration. Improvement of these sections will be under way this year and ultimate construction of a more permanent type of pavement has been advocated by State Engineer General George W. Goethals of Panama Canal fame, who has foreseen the real economy of constructing such main line highways of the most permanent and lasting type, even regardless of first cost.

Approximately 400 miles across Pennsylvania, through the Allegheny mountains, the Lincoln Highway is smooth, well kept macadam, and leads through a



Showing Type of Best Brick Construction Along Rolling Highway Between Dixon and Sterling, Lee County, Ill.



Reducing a Grade and Curve on One of the Long Stretches of the Lincoln Highway That Crosses the State of Iowa.

country of the utmost scenic beauty. There are but 14 miles of Lincoln Highway unimproved in the State of Pennsylvania.

Travelers of the present year may be forced to make numerous short detours in Ohio due to Lincoln Highway improvement in progress. Permanent construction is to be rushed in each of the 13 counties of the state traversed by the highway as a patriotic response to the request of the Council of National Defense, for the improvement of the Lincoln Highway.

Less than 20 miles of really bad roads are encountered in crossing the entire State of Indiana. Long stretches of brick and concrete highway testify to the endeavor of the people of the Hoosier state to bring this great memorial highway into the perfect condition which its importance justifies. In dry weather the trip across Illinois, Iowa and Nebraska can be made over well graded, dragged and drained dirt roads, but in the latter two states especially rain furnishes a barrier to all traffic. When it rains the tourist must stop, if he wishes to save his car, his time, his tires and his temper.

Due to the exceptionally heavy traffic of the past year, sections of the Lincoln Highway in Wyoming gave way and presented very bad traveling to the motorist using the road late in the year, but

the Wyoming State Highway Department, with the assistance of the county authorities all along the route, has promised to have the Lincoln Highway in condition for such traffic as it is called upon to carry during the present year.

In Utah and Nevada that part of the Lincoln Highway properly known as the desert section is encountered. The drive from Salt Lake City to Ely, Nev., should not be lightly attempted. Adverse weather conditions here can make the road impassable, but when dry the route can be and is driven without serious difficulty, and with much of absorbing interest and scenic grandeur to make up for any minor inconveniences.

California provides a perfect trans-state road and a drive of wondrous scenic beauty.

Long distance motor traffic is no longer a novelty in this country; it is becoming the rule. A motor trip of 2000 miles no longer creates comment. Out-of-the-way spots, inaccessible by rail, once lonely trails whose heaviest traffic not long since was the occasional passage of the prospector with his ambling burro or the native in his swaying buckboard, now swarm with tourists from every section of the Union.

The army of motor travel is now mobilizing and by June will be upon the highways of the country in full strength. Then upon the Lincoln Highway you

will be able to see the license tags of every state in the Union. Upon America's main street, between the Statue of Liberty and the Golden Gate, Americans will be rubbing shoulders and fenders, meeting each other, exchanging ideas, gaining a broader insight into the vastness of our land and its resources, being inspired anew by the historical associations which from Valley Forge to the Presidio teem along the trail, gaining new health and confidence and good American "punch" in the God-given spaces of our Far West.

FIRESTONE HAS EFFECTIVE LIBERTY CAMPAIGN PLAN.

In securing subscriptions to the Third Liberty Loan the City of Akron, O., was distracted industrially. In the Firestone Tire and Rubber Co.'s organization a committee of 130 was formed and a plan adopted to finance those who could not buy for cash at the rate "a dollar down and a dollar a week" for a \$50 bond, or double this rate of payment for a \$100 bond. The subscription plan campaign opened April 8th and closed April 15th, during which time 99 per cent. of the employees in the factory organization subscribed, and in the office organization 96 per cent. of the total employees subscribed. The total subscription was \$562,500.



Crossing "No Man's Land" Over the Lincoln Highway on a Western Desert. Deep Ruts Indicate Extent of Tourist Traffic Over This Vast Area of Sand, Which Seems Endless to the Horizon.

Col. George Pope Dies at Home in Hartford

Pioneer Bicycle and Motor Car Manufacturer and Leader in Instituting the Great National Automobile Shows.

Col. George Pope, treasurer of the National Automobile Chamber of Commerce and one of the pioneer automobile manufacturers of the country, died in Hartford, Conn., on April 20 at the age of 74.

He was born in Boston on Jan. 4, 1844, and attended the public schools of Brookline, Mass. He enlisted in the 44th Massachusetts Infantry when the Civil War began, and when Col. Shaw's 54th regiment, composed of colored men, was formed, he was commissioned a captain. Capt. Pope was severely wounded and Col. Shaw killed in a bloody assault on Fort Wagner in Charleston harbor. He was commissioned a major at the age of 20 and at 21 was a lieutenant-colonel. In 1881 he began the manufacture of bicycles, beginning business with S. S. McClure, who handled the advertising end of the work for a time.

Col. Pope entered the employ of a Boston lumber company after the war and in 1868 was sent to Montreal to take charge of the concern's branch office there. In 1890 he was made president of the Hartford Cycle Co., a branch of the old Pope Bicycle Co., founded by his cousin, the late Col. Albert A. Pope. In 1899 when the bicycle interests of the country were consolidated and merged into the American Bicycle Co., he became vice president of the latter company. In 1903 he was made treasurer of the Pope Manufacturing Co. of Hartford, Conn., which manufactured the Pope-Hartford automobile.

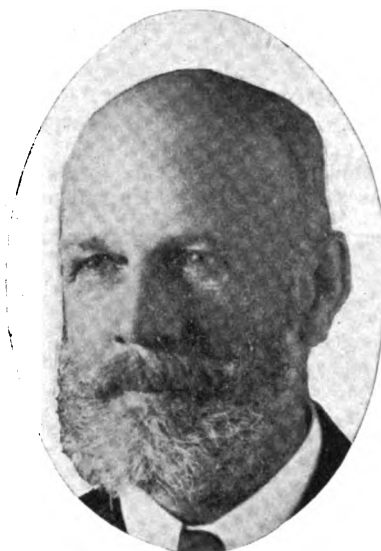
Colonel Pope's first active interest in motor cars was in 1897, when his company put on the market several Columbia electric phaetons. He was at one time chairman of the show committee of the Association of Licensed Automobile Manufacturers and the Automobile Board of Trade. When the Electric Vehicle Manufacturers' Association was formed in February 1906, he was elected president.

When Col. Pope accepted the presidency of the National Association of Manufacturers five years ago the country was facing some of the gravest industrial problems in its history, chief of which was the growing antagonism between employer and employee. In March, 1916, he inaugurated the National Industrial Conservation movement. A country wide campaign, having for its object the establishment of a closer relationship between the wage earner, the wage payer and the consumer. When the United States entered the war Col. Pope redirected the aims of the National Industrial Conservation movement in such a way as to aid the government in its efforts to increase industrial production for war purposes. He also began an in-

vestigation into the subject of restoring injured soldiers and sailors to industrial usefulness, planning eventually to make the National Association of Manufacturers a clearing house for the reabsorption of American workers who had been crippled in the service of their country.

The success of the National Automobile Shows in New York and Chicago was due largely to Col. Pope's efforts as the chairman of the show committee of the Association of Licensed Automobile Manufacturers and its successor, the Automobile Manufacturers and its successor, the Automobile Chamber of Commerce.

He is survived by a brother living in Boston and by a daughter, Mrs. Charles H. Gillette of Hartford.



Col. George Pope, Former Treasurer of Pope Manufacturing Co., President of National Association of Manufacturers and Treasurer of the N. A. C. C.

APPROPRIATIONS FOR PLOWING HIGHWAYS.

A bill introduced in the Massachusetts Legislature authorizing the Highway Commission to expend part of the motor vehicle fees for the purpose of keeping certain of the state's trunk lines open for highway traffic during the winter months has been reported upon favorably by the committee on roads and bridges to which it was referred.

The American Woolen Co., the Boston and the Worcester Chambers of Commerce, the Springfield Board of Trade, the Associated Industries of Massachusetts, the Hood Rubber Co. and others favored the measure.

This legislation is similar to that enacted in the State of Connecticut last year as an emergency measure and designed to facilitate the operation of motor trucks throughout the winter as a means of relieving freight congestion on the railroads. The bill provides that the amount to be expended for such work will be settled upon in a conference between the Highway Commission and the Committee on Roads and Bridges.

License Fees Over \$3,000,000 in Pennsylvania

Sum Is Almost as Great as the Total Received During the Entire Year of 1917.

The State of Pennsylvania has issued over 342,219 licenses this year up to April 1st and has taken in over \$3,000,000, or nearly as much as the total received during the entire year of 1917. The licenses have been issued under the following classifications:

Pneumatic tired vehicles, 252,770; solid tires, 21,106; tractors, 969; trailers, 643; dealers, 6556; tractor dealers, 75; motorcycles, 12,002; drivers, 49,026; transfers, 72. In addition to these totals there are 66,538 non-paid operators of cars in the state. This number includes owners, wives and members of the owners' families who run their own cars.

Advance in Motor Car Insurance Limits

Underwriters Fix New Schedules Applicable to Both Passenger and Commercial Cars.

The Eastern and New England Automobile Underwriters' conference has sent out a joint notice of an increase in the limits of insurance as follows: "By resolution of the Executive Committee of the National Conference, the percentage limits of insurance allowable upon last year's cars (that is cars bought new more than six, but not more than 18 months prior to insurance), columns C, D and E, and year before last cars (that is cars bought new more than 18, but not more than 30 months prior to insurance), columns B, C, D and E, are increased by adding 10 per cent. to the percentage limits of insurance shown on the present rate sheet.

This makes the percentage limits of insurance read as follows:

Last year's cars (that is cars bought new more than six, but not more than 18 months prior to insurance):

Column A.....	No limit
Column B.....	80 per cent.
Column C.....	80 per cent.
Column D.....	70 per cent.
Column E.....	70 per cent.

Year before last cars (that is cars bought new more than 18, but not more than 30 months prior to insurance):

Column A.....	No limit
Column B.....	60 per cent.
Column C.....	60 per cent.
Column D.....	50 per cent.
Column E.....	50 per cent.

These changes apply to both passenger and commercial type cars and are effective immediately.

Further Cut In Car Production Agreed Upon

War Industries Board and Fuel Administration Plan On Curtailment of About Fifty Per Cent in Normal Schedules

The War Industries Board and the Fuel Administration have agreed upon plans to restrict the manufacture of automobiles to approximately 50 per cent. of the normal output, and it is probable that announcement will be made soon containing the details of the curtailment program to be put into effect.

Under an agreement with the manufacturers, entered into voluntarily, the output already has been reduced to 30 per cent. The new rules, if adopted, will mean an additional curtailment of 20 per cent.

Representatives of several of the big automobile concerns were in Washington and conferred with representatives of the War Industries Board, but the final decision was deferred and it is probable that further conferences will be held.

The question of cutting down the manufacture of passenger cars has been under discussion for some time, as industries considered more vital to the war have made heavy demands for chrome and manganese, which are necessary to the hardening of steel plates. The automobile industries use large quantities of these materials. Many thousands of skilled workmen who were essential to government war work, such as the aircraft program and ordnance work, are being employed in automobile factories, and it is also planned to use a larger number of these men in war work.

The general plan will be to use the portions of automobile factories which are released by the curtailment program for war work and it is believed that this can be done without serious loss of working time or the disturbance of labor.

The curtailment will not affect seriously the portions of plants used in the construction of motor trucks which may be used for war work or to aid in solving local transportation problems.

It had not been expected in the automobile industry that any curtailment in production of cars for 1918 would be as high as 50 per cent. of the 1917 schedules. There were 1,719,000 cars counting all kinds, built last year.

When the automobile industry volunteered recently to cut its production 30 per cent., it was to save coal. The offer was made to the Fuel Administrator, who asked suggestions as to how the motor car industry might help. The automobile industry soon will be able to replace a large number of the men laborers who are drafted into government work with women. Many women are now employed in various ways in motor car plants and their field of work will be broadened, so that they can do mechanical work here as they have long been doing in England.

In Europe the production of passenger cars has practically ceased with the ex-

ception of the Fiat company at Turin, Italy. England only produced four passenger cars last year, while France did not manufacture any.

As previously stated in the Automobile Journal, all indications point to a duplication in this country of the conditions now obtaining in Europe in the used car market where practically every type and class of car is selling for more than its original selling price even though several years old.

AUTOMOBILES ON THE ISLAND OF NANTUCKET.

Governor McCall of Massachusetts has signed the bill which will permit the

operation of motor vehicles on the island of Nantucket if the townspeople accept the act at a special town meeting within the next three months. The measure which recently passed the Legislature repeals the act of 1914 prohibiting the operation of automobiles on the island of Nantucket.

The present bill was the object of a bitter factional fight among the Nantucket people, many residents opposing the admission of cars to the island, while the summer visitors took the other side of the question. Nantucket is a large island off the southern coast of Cape Cod and lies just east of the island of Marthas Vineyard. There are only a few miles of good highways on the island.



The AC Float, Which Participated in the Liberty Day Parade at Flint, Mich., on April 6th.

The Calendar of Coming Events.

RACING.

May 16—Uniontown. Uniontown Speedway Association.

May 30—Sheepshead Bay, N. Y. Championship races.

June 22—Chicago. Chicago Speedway.

July 4—Cincinnati. Cincinnati Speedway.

SHOWS.

May 3-7—Lima, O. Ohio State Automobile Association.

Sept. 23-28—Chicago. National Accessory Show for Fords. Coliseum.

ASSOCIATIONS AND ENGINEERING.

May 10—New York Highway Traffic Association. 8:30 P. M. Automobile Club of America Building.

May 13-18—Cleveland. War Convention of Machinery, Tool and Supply Industry of the United States.

June 3-4—Chicago. National Gas Engine Association. Eleventh Annual. Hotel Sherman.

June 5-12—Hot Springs, Va. National Association Automobile and Accessory Jobbers.

June 17-19—Dayton, O. Society Automotive Engineers. Annual Midsummer Session.

June 26-28—Buffalo, N. Y. American Society of Heating and Ventilating Engineers.

Sept. 2—Cripple Creek, Col. American Institute of Mining Engineers.

Nov. 14-15—New York. Society of Naval Architects and Marine Engineers. Twenty-sixth general meeting. Engineering Societies Building, 29 West 39th street.

Local Authorities Are Hampering Driveaways

Obstacles Put in Way of Efforts to Conserve Railroad Cars—Lack of Uniformity in State Laws Responsible.

Patriotic efforts of the automobile trade to avoid use of railroad cars by delivering motor cars from the factories by highway under their own power are being interfered with by over-zealous local officials acting under technicalities of the various state laws.

From 30 to 40 per cent. of the automobiles produced by the larger manufacturing companies are being delivered overland because of the difficulty of obtaining freight cars for shipping, but in many places in states through which the strings of new cars are driven en route to destination the drivers are held up by the local sheriff or constable and threatened with arrest and fines.

For example, a string of 60 cars that was being driven from Lansing, Mich., to New York City was halted in York, Pa., by the sheriff because only the first and last cars had license plates. The sheriff insisted that every car should have a plate. To take out a Pennsylvania license would have cost \$20 for each car, although the train was merely passing through one corner of the state and all the vehicles were being delivered to a single dealer in New York City.

It was necessary for the dealer to secure 50 odd duplicates of his New York dealer's license, at \$5 each, and ship them to York before the drive-away could continue. This caused a delay of more than a day, an expense of more than \$250 for plates and hotel bills and other expenses aggregating \$750. Thus it cost more than \$1000 just to drive once through the northeast corner of Pennsylvania.

In another instance a string of more than 30 automobiles was held up in Wilmington, Del., and the drivers threatened with arrest because they did not have state operators' licenses. The cars were being driven from New York to a dealer in Norfolk, Va. Neither New York state nor Virginia requires such licenses and the Norfolk dealer contends that it is unfair and unnecessary to require drivers of cars passing through a corner of Delaware on a single business trip to take out a license to operate for a year in that state.

The police in Frederick, Md., objected because some of the cars had the dealer's license number painted on cardboard instead of the regular metal number plates. In Virginia only six or eight duplicates of the dealers' license plate are issued to a single dealer, who is permitted to make temporary duplicates himself, but the authorities in Maryland threatened him with a fine for this.

Numerous other technicalities of the laws in these and other states have been

invoked to cause interference with such drive-aways. The automobile trade is becoming indignant over the legal difficulties placed in the way of their efforts to continue in business despite the obstacles arising from lack of railroad shipping facilities.

The annoyances and additional expense involved are due to lack of uniformity in state laws and to the fact that legislators did not foresee and make provision for the delivery of automobiles overland from factory to dealer. This condition and the strict enforcement of the exact letter of the laws will cause an insistent demand for federal licensing and regulation of motor vehicle operation. With the increase in interstate operation of motor trucks and passenger automobiles, the provincial system of state regulation has become intolerable and owners are urging that the United States follow the long established custom in European countries of issuing national licenses.

Racing Will Open at Sheepshead Speedway

Harkness Handicap at 100 Miles Will Head Program at Big Oval on Memorial Day.

The motor car racing season will open on Memorial Day at Sheepshead Bay Oval, Long Island, with a program that promises to be as interesting as any that were staged last year, as in addition to the many star drivers, Dario Resta, the speed king of 1915-16, has announced his intention of entering the field again and will participate in the leading events.

Another noted driver who will enliven the events is Arthur Duray, the European champion, who holds the world's mile record of 147 miles an hour.

The Harkness handicap at 100 miles will be the outstanding feature of the racing carnival at the Sheepshead Speedway. Many of the world's greatest drivers will compete in this race, as well as in the other events on the program.

Harry S. Harkness, the millionaire sportsman and owner of the speedway, for whom the handicap is named, will be the donor of a costly trophy, while Promoter W. H. Wellman will hang up a record breaking purse. In addition to the automobile events on May 30 there will be a series of aerial exhibitions by aviators, both men and women. The Memorial Day meet will be the first in which the members of the Sheepshead Speedway Motor Club, Inc., will participate. A members' race is planned by President Wellman.

The decision to resume automobile racing has met with the approval of officials at Washington, as it is not only deemed advisable to keep alive all clean sports, but the speedway contests are considered useful in that they have been the means of developing the gasoline engine.

Another Advance in Pneumatic Tires

Leading Companies Manufacturing Tires Have Put Into Effect Higher Schedules on Tubes and Casings.

There has been a general advance in tire prices, which action on the part of the manufacturers was expected and foreshadowed by a number of developments affecting the supplies of material that enter the construction of pneumatic tires. It has been known for some time that another increase in tire prices would have to be made to meet the rising costs of cotton fabrics and labor, but now even a shortage of crude rubber is in prospect through the decision of the shipping board to put into effect a reduction of approximately 50 per cent. in rubber imports as a means of conserving the cargo-space for war needs.

In view of this latest development in the situation the trade looks for even higher prices for tires than those which have already gone into effect or those that are about to become effective. With a rising market on practically everything entering the manufacture of a tire, including labor, rubber and cotton, there seems to be no other course open for the makers than to meet the situation by increasing prices.

The Michelin Tire Co. has increased the prices of inner tubes and 3, 3½ and 4-inch tires 10 per cent., and 4½ and 5-inch tires five per cent.

The Ajax Rubber Co. has increased all prices 10 per cent.

The Fisk Rubber Co. has increased the prices of all tires and tubes 10 per cent.

The Republic Rubber Co. has increased the prices of automobile and truck tires and inner tubes 10 per cent.

The United States Tire Co. has increased the price of all automobile tires and tubes 10 per cent. with the exception of Nobby Tread tires, which remain the same. Pneumatic truck tires have also been increased 10 per cent. No advance has been announced on solid truck tires.

The Goodyear Tire and Rubber Co. has advanced all prices 10 per cent., effective immediately.

The B. F. Goodrich Co. has advanced all prices 10 per cent.

The Miller Rubber Co. will increase all prices 10 per cent. on May 1.

The Firestone Tire and Rubber Co. has advanced the prices on non-skid and fabric tires from 12 to 15 per cent. and on plain tread tires and inner tubes 10 per cent.

The Batavia Rubber Co. will increase the prices of all tires and tubes 10 per cent. May 1.

The Empire Rubber and Tire Co. has increased prices of all tires and tubes 10 per cent.

Y. M. C. A. Appeals for Drivers for Overseas

Men of High Calibre Wanted for Ambulance Work. Those Who Can Make Own Repairs and Supervise Work in An Emergency Preferred

HAVING satisfied all demands for automobile drivers for April, the National War Work Council of the Y. M. C. A. has issued an appeal for 75 men to go overseas in May for service with the American Expeditionary Forces and the French armies in the work intrusted by the United States and France to the association. As explained by W. O. Willson, recruiting secretary for the Y. M. C. A. motor transport service, 347 Madison avenue, the special need at this time is for so-called "gentlemen drivers," men who own their own cars and know enough about their machinery to make minor repairs if necessary.

"While we desire as many volunteers as possible who can contribute their services," said Mr. Willson, "we welcome the man of the highest type who cannot afford to go overseas at his own expense. The Y. M. C. A. is not in a position to pay high salaries, but men with dependents may enlist with the full knowledge that the Y. M. C. A. will do everything possible to relieve them of their responsibilities and obligations at home while they are in France.

"We want the highest grade of men, American business and professional men. Their duties will require unusual versatility. At one hour of the day they may be in conference with a division commander regarding questions of policy, and later they may be bossing a crew of men in the loading or unloading of the truck. Recruits for this service must be able to 'meet the colonel' on equal terms and at the same time direct the work of men in the most subordinate positions."

The motor transport service under the Red Triangle offers an opportunity for worth while service to men who are beyond military age. A man who is 50 years old, if he is in sound physical condition, can be utilized by the Y. M. C. A. where the military authorities would spurn him for service in the trenches. As an indication that the motor transport driver may find that his job is far from tame, Mr. Willson says:

"In the last German drive every available Y. M. C. A. truck was turned into an ambulance and in many cases our trucks were the last to leave the fields and villages that were captured. A man who goes as a driver must be prepared for such service as this and after he has done it he will be satisfied that he is doing his bit equally with his younger brother who has gone over the top or is waiting for the order to advance.

"Of course such opportunities for courage under fire won't come to the recruits in this service every day. For the most part they will drive and take care of their own trucks, camions or scout cars. Mechanics have been enlisted to do the intricate repairing. But

there is also the possibility for service in an emergency. Our drivers may be called upon to jump from their trucks to pick up a shovel and feverishly help in the digging of a trench; the construction of a Y. M. C. A. hut may require an extra man; whatever the service our Y. M. C. A. men must be prepared.

"We want men who are willing to take orders and fill them to the letter; men who can give orders and have them carried out. In France the smallest and apparently most insignificant duty may assume proportions of tremendous importance. Over there the test of the big man is his ability to do a small job in a big way. Men who are absolutely dauntless are the men for whom we are looking."

The post exchange work is a large field for business men of proved ability as organizers. The post exchanges are the "general stores" of the camps and trenches; everything is sold there and they are the assembly centres for the men when off duty. To keep them running at their maximum efficiency requires that the motor transport service be efficient, even in the face of the greatest difficulties. Men who can coordinate transportation, Mr. Willson declares, will find no limit to the opportunities given by the service which is doing at the request of the allied governments.

"When you enlist under the Red Triangle of the Y. M. C. A. in the motor transport service," says Mr. Willson, "you will be sent to France as a truck driver, but your ability will be used to the fullest extent and the field for your courage and initiative and ability will be absolutely unlimited."

PENNSYLVANIA RUBBER GIVES ELECTRIC SIGN.

The Pennsylvania Rubber Co. has tendered and had accepted by President Wilson for use in connection with the Third Liberty Loan their \$30,000 talking electric sign on Columbus Circle, New York City.

NORTHWESTERN CHEMICAL INCREASES CAPITAL STOCK.

At a recent meeting of the directors of the Northwestern Chemical Co., Marietta O., it was decided to increase the capital stock of \$150,000 to \$500,000.

The increase in capitalization was made to take care of the company's increasing business and to provide for the erection of two large new buildings, which are practically completed at this time. This is the fourth time in the past two years that the Northwestern has had to erect more buildings and provide ad-

ditional space for manufacturing the well known line of Norwesco Utilities, sometimes known as the "Chemically Correct" line.

This company manufactures a complete line of chemical specialties. Some of the most prominent being a radiator cement, radiator cleaner, mohair and leather top dressings, carbon remover, cements, color varnishes, etc.

PIKES PEAK HIGHWAY OFFICIALS MAKE PLANS.

President C. F. Adams and Secretary-Treasurer A. W. Henderson met with President F. R. Calvert of the Indiana Division of the Pikes Peak Ocean-to-Ocean Highway Association at Indianapolis on April 8, and with President E. S. Ralph of the Ohio division at Springfield on April 9, for conference regarding the work of the National Association, and that of these two state divisions. At these conferences particular emphasis was placed upon the importance of keeping the state divisions intact and active for such work as may be necessary; to the desirability of completing the markings through each state at the earliest practicable date; to finance and to the arrangements for early meetings of the state divisions in order that they may map out their programs and take hold of the work for the year.

Assurance was given that every effort will be made to see that the gaps in the marking both in Ohio and Indiana will be closed up; and arrangements for the state division meetings will be considered at the close of the Liberty Loan campaign. Gratifying reports as to road conditions and as to plans for needed road development were made.

President E. S. Ralph has announced the appointment of Mr. T. J. Appleyard, secretary of the Newark, O., Chamber of Commerce, as the new secretary-treasurer of the Ohio state division. He succeeds Mr. E. W. Mentel, the efficient secretary, who has recently taken up his new duties as the industrial commissioner of the Kansas City, Mo., Chamber of Commerce.

National headquarters has been advised of the resignation of Mr. R. M. Pope of Duchesne, Utah, as president of the Utah state division, and of the appointment of Mr. H. W. Harvey of Heber City as his successor. Mr. O. J. Stillwell, secretary of the Publicity Bureau of the Weber Club of Ogden, has been named as secretary-treasurer to succeed Mr. Robert Dalgleish of Park City, now in Uncle Sam's service. Mr. W. L. Dean of Duchesne fills the vacancy as a national director; Mr. W. D. Sutton of Park City continuing as the fourth director.



AMONG the millions of automobilists of the world there is no more familiar word than "Michelin," which is recognized as typifying a tire of quality wherever automobiles are used. Michelin tires have been for many years widely and favorably known throughout New England, but this season the demand is especially heavy because the company is able to give its trade prompt service as regards deliveries, which is very important when many sources of supply are tied up in endless transportation delays.

The Michelin factory is very fortunate in its location, which has both tide water and rail connections with New York, so that New England shipments can be made over night by either water or rail.

The Michelin family began the manufacture of rubber in 1832. It was probably further advanced in this industry than any other concern when in 1891 Edouard Michelin produced the first pneumatic bicycle tire; in 1895 he made the first pneumatic automobile tire, and because no automobile manufacturer would use this novel equipment he built a motor vehicle that was driven in the Paris-Bordeaux race that year, thus proving the merits of the pneumatic tire.

Practically originating the industry and pioneering its development, Michelin was foremost in tire production. Michelin tires were used very largely by French automobile builders. Michelin perfection were accepted as the best the world over. Michelin designed the first anti-skid treads, these being protected with steel-studded leather bands and were first used in the Gordon-Bennett cup race in 1905. The following year Michelin built the first demountable rims, which were used in the Grand Prix race of the Automobile

Club of France.

In 1904 Michelin established a factory in London, so great was the demand in England for its tires. A second branch factory was opened at Turin, Italy, in 1906, and a third factory at Milltown, N. J., in 1907. Its sales organization was developed until in all countries where tires were sold and claim was made that the company was the largest tire manufacturer of the world.

Previous to the establishment of its American factory the company had branches in this country and was represented in all commercial centres by agencies. With the completion of the plant at Milltown the company perfected an organization with headquarters at the factory and since that time its activities in the United States have been directed

through its sales organization, in every city and town of consequence in the New England states.

Michelin tires are claimed to be the best quality that science can produce. They have been perfected by extremely careful engineering, and this applies to both design and material. The Michelin Tire Co. does not qualify this claim. It is equally positive in its statements with reference to tire service for owners, which is afforded through a sales organization created with great care to meet every requirement of the dealers and through them the car owners. Every practical endeavor is made to strengthen this organization, to insure the cooperation of the company with the dealers, with the purpose of better serving users of Michelin tires.



The Display Window of the New England Michelin Branch, 901 Boylston Street, Boston, Showing the Decorations to Stimulate Liberty Bond Buying.

through that division. Because New England for a number of years absorbed up to a third of the entire production of the American automobile industry, because it was first in automobile shows and sporting events, Michelin tires were very largely demanded in this section of the country. The New England branch at Boston was established directly following the opening of the New York branch, and since that time the company has had direct representation in Boston, and,

The policy of the company is to have representation wherever accessories, supplies and equipment are sold, and at all garages and service stations, so that owners can be sure of obtaining tires whenever desired; to be in constant touch with all its dealers through a force of expert sales representatives, who are prepared to deal quickly with and satisfactorily determine conditions that may arise with reference to tire service. This sales organization has been created with extreme care. It consists of eight men, attached to

the branch at 901 Boylston street, Boston, all of whom know Michelin tires and understand Michelin policies thoroughly.

The branch organization consists of the manager, office manager, chief adjuster and five men who systematically cover all of the six states, with accounting, order, stock and repair departments. These six men are constantly in contact with the dealers—the chief adjuster and the salesmen, and the manager personally deals with subjects that are referred

to him either by the salesmen or adjuster or the factory. The greatest degree of cooperation is thus obtained. The interests of the dealers and owners are personally passed upon and determined satisfactorily. The regular visits of the salesmen to dealers are frequent, each man traveling with an automobile.

The sales policy of the company is to keep up to a standard the stock that each dealer carries, and this is done by frequent, even daily, shipments from the branch. The Milltown plant, being in New Jersey and close to New York City, is located more advantageously for stock maintenance than that of any other tire

company. Tires can be sent to New York City by train or truck and shipped by boat to Boston, whence they are distributed by various parts of New England as will best serve the dealers. They can be shipped by any means, even parcel post, that will insure the quickest dispatch. The branch is always fully stocked, so that any demands can be met upon receipt of the order.

There is minimum handling necessary in distribution, for when railroad cars are available tires may be packed loose instead of crated, and they can be delivered close to the branch in Boston. The branch has a truck with which deliveries

are made to Boston and its suburbs and to all shipping points. There is no need for delay in filling orders. Equally careful attention is given to handling repair work.

Reference has been made to the sales organization. The men composing it have been associated with the company for years. They have had long experience with tires and the needs of dealers and owners. The policy of the company is perhaps best reflected by the character and caliber of the men representing it.

The following brief sketches will demonstrate their experience in the tire trade:

Michelin New England Sales Organization

MANAGER WILLIAM L. HOGARTY.

William L. Hogarty, sales manager for the Boston branch, though young in years, is a veteran with the company. He was born in Boston and lived there all his life. He has been extremely successful as a tire salesman and has been instrumental in the development of Michelin trade in New England since he entered the employ of the company in 1909. In 1914 he was made a special representative and for a considerable period was engaged in establishing agencies in California and Arizona. He was appointed manager at Boston in 1916 and has developed what

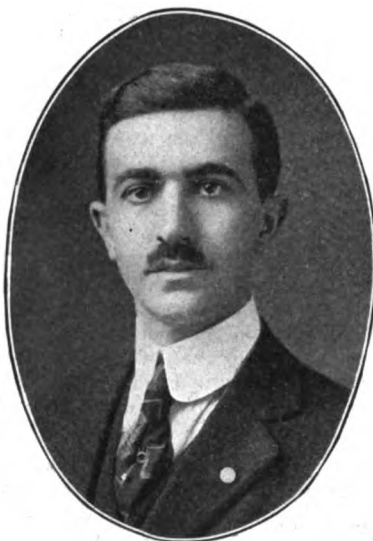


Manager William L. Hogarty,
Boston Branch.

he believes to be the most productive market for Michelin tires in the country. He is prominent as a member of the Bay State Automobile Association and Boston Lodge, B. P. O. E.

OFFICE MANAGER H. E. WEST.

Office Manager H. E. West devoted himself exclusively to the branch, where he has charge of the office detail, directs the greater part of the correspondence, passes on credits and approves orders and supervises the shipping. He entered the employ of the company in March, 1911, as cashier of the Boston branch, and later was made chief clerk. In November, 1916, he was made office manager. He had a period of service at the



Office Manager H. E. West,
Boston Branch.

plant and main office at Milltown to better train him for his work and get first hand knowledge of the methods and policies of the company.

CHIEF ADJUSTER MILTON T. SILZER.

Chief Adjuster Milton T. Silzer has been engaged in the tire trade since he



Chief Adjuster Milton T. Silzer,
Boston Branch.

finished his education, going from his home at New Brunswick, N. J., into the stock room of the company's plant at Milltown as a junior clerk. There he worked in different departments and into the main office, obtaining experience and evidencing capability that caused him to be attached to the New York City and the Chicago branches, and in 1915 he was stationed at Boston, where the increasing business necessitated the presence of a man specially qualified for adjusting. From every point of view a Michelin man, Mr. Silzer has met the requirements of his position with satisfaction to the company, the New England dealers and their customers.

MORRIS M. MARPLE.

Morris M. Marple of Bridgeport, Conn., is salesman, covering Connecticut and Hampden, Hampshire, Franklin, Berkshire and part of Worcester coun-



Morris M. Marple, Salesman, Connecticut and Western Massachusetts.

ties—practically the western half of Massachusetts. For more than 12 years he has called on the trade in this territory, first being connected with Morgan & Wright, which concern was merged with others in the United States Tire Co. He maintains that he was the pioneer tire salesman in this section and that he

knows the dealers more intimately than any other man. He joined the Michelin company in October, 1908, and aside from a western trip in 1911 he has been constantly in touch with his customers.

L. M. WEENER.

Michelin trade in Rhode Island and southeastern Massachusetts is served by L. M. Weener, who completed his seventh year of association with the company April 1. He was for about a year a member of the office staff, being eventually in charge of the stock and order departments, and then he was attached to the sales organization, which work he has since continued. He has been very successful and has established a very large business in the territory. Besides selling Michelin tires he has given much attention to music, being tenor soloist in



L. M. Weener, Salesman, Rhode Island and Southeastern Massachusetts.

one of the leading Boston churches, and he has participated frequently in concerts of importance.

HARRY J. COBB.

Harry J. Cobb represents the company in New Hampshire and Vermont. He has been with Michelin only a short time, although he has sold tires for nine years and is widely known to the trade. Prior to joining Michelin he worked for Morgan & Wright, and sold tires at Middlebury, Vt., where Michelin



Harry J. Cobb, Salesman, Vermont and New Hampshire.

shoes and supplies were handled exclusively.

EDWARD J. FITZGIBBON.

Edward J. Fitzgibbon, who visits the dealers in Maine, the largest territory of all New England, is the youngest salesman of the staff. After working for the



Edward J. Fitzgibbon, Salesman, Maine.

Michelin company two summers while finishing his education, four years ago he entered its employ regularly. He started in the shipping room and worked through different departments, constantly winning promotion, until he was made a salesman, first in the branch and later outside. When a rearrangement of territory was necessary to meet the demands of the trade he was assigned to Maine.

F. W. DOHERTY.

F. W. Doherty is essentially a Michelin man. He was born in Boston and sought employment in the manufacturing division of the Milltown plant, where in overalls and jumper in different departments he did all kinds of production work. This afforded him a splendid practical knowledge of tire making, as well as Michelin methods. His capacity was such that he was transferred eventually to the sales department, and after service at the factory and elsewhere he was attached to the Boston branch, being assigned to Maine and New Hampshire. One season he was in charge of



F. W. Doherty, Salesman, Boston and Eastern Massachusetts.

adjustments at Boston and also made a trip to the Pacific coast as special representative. He is now visiting the trade in Boston, covering Suffolk, Norfolk, Middlesex and Worcester counties.

History of the Pneumatic Tire

The writer made a careful study of the pneumatic tire while abroad during the summer of 1913. He saw Thomson's original "aerial wheel" in the South Kensington Museum in London, and during his studies learned many interesting facts that may be summarized as follows:

The pneumatic tire had its origin in England, and its birth certificate will be found in the patent registered on Dec. 10, 1845, by R. W. Thomson. He describes it as a means of "perfecting the wheels of carriages and other rolling bodies." And turning to the actual test of the patent, we find a fuller descrip-

tion, as follows:

"The nature of my said invention consists in the application of elastic bearings round the tires of the wheels of carriages, for the purpose of lessening the power required to draw the carriages, rendering their motion easier, and diminishing the noise they make when in motion. I prefer employing for the purpose a hollow belt composed of some air and water tight material, such as caoutchouc or gutta percha, and inflating it with air, whereby the wheels will in every part of their revolution present a cushion of air to the ground or rail or track on which they run."

The invention was naturally first tried

on carriages, and in the *Mechanics' Magazine*, Nos. 1235 to 1239, of April and May, 1847—nearly 70 years ago—we find the following announcement:

"Messrs. Whitehurst & Co., coach builders, have acquired from Mr. Thompson, the patentee of aerial wheels, the rights for applying them to all kinds of vehicles. These wheels give to carriages a gentleness of motion absolutely impossible to obtain by any sort of spring; they affectually deaden all noise from the wheels; they prevent bumping and shaking and render traction considerably more easy than with ordinary wheels, especially on bad roads.

"Messrs. Whitehurst & Co. have fitted

a brougham with aerial wheels in order that anyone wishing to try them may do so. Address 313 Oxford street."

The same magazine returned several times to the subject of this remarkable invention, and in its issue of March 27, 1847, expressed astonishment at the discovery that the new kind of wheel, whose only merit they had thought to be its quietness in running, had merits still more striking.

"Careful experiments," they write, "experiments we have repeated and verified, prove incontestably that both friction and traction are considerably reduced by the use of these wheels. The experiments we refer to were made on the 17th of March, 1847, by Messrs. Whitehurst & Co., the eminent firm of coach builders, and by the inventor, Mr. William Thomson. In the experiment two stretches of road were used, one a smooth surface, while the other was covered with newly broken stones."

Then follows in detail the result of these trials, showing that the saving in traction of the patent wheels as compared with the ordinary was, on the hard road, well packed, macadamized and level, 38 per cent., and on the road covered with newly broken stones, 68 per cent. The writer concludes: "The fact is therefore established that we have here a wheel which not only makes very little noise, or, to speak correctly, is itself absolutely silent in running (for it appears that all the noise arose from the body and fittings of the carriage), but which demands far less effort in traction, and should consequently suffer less from wear and tear and last proportionately longer."

Two years later, in their issue of June 2, 1849, the same magazine again returns to the subject. "We have recently had the pleasure," they write, "of riding in a carriage fitted with these wheels. Several improvements have been made in them since we described them in an earlier issue. These improvements are of a very marked kind: the leather envelope which covered the air tube has been replaced by an envelope made of a special kind of cloth, expressly manufactured for this purpose, and on the exterior of the cloth, where it is exposed to the wear and tear of the road, a band of India rubber has been fixed.

"In spite of the opinion which many might form on seeing these wheels for the first time that the traction loss would be much increased by a tire made of a soft and giving substance, we can aver that traction is without a doubt, much lessened." Then after a detailed account of further experiments, all confirming the results previously obtained, the writer concludes: "These results are entirely due to the fact that the tires are perfectly elastic as well as soft; they do not sink into loose gravel or damp soil as ordinary wheels do; in paved streets

they do not retard the carriage with every shock received from the paving stones or other obstacles they have to pass over; they adapt themselves to every irregularity of surface, allowing the carriage to run on without being lifted from the ground, while the India rubber tire is restored to its original shape directly the obstacle is passed. We



Edouard Michelin,
"Father of the
Pneumatic - Auto-
mobile Tire."

cherish the hope that these wheels will before long come into general use."

We have seen that Thomson invented the pneumatic tire in 1845, and that it at once fell into such complete oblivion that Dunlop in 1888, might well have thought he was patenting the pneumatic principle for the first time. When the pneumatic tire was originally introduced nobody cared to have it; the ordinary iron-tired carriage satisfied the needs of our ancestors, and rubber tires seemed to them a superfluous luxury.

But in 1888 a new form of locomotion

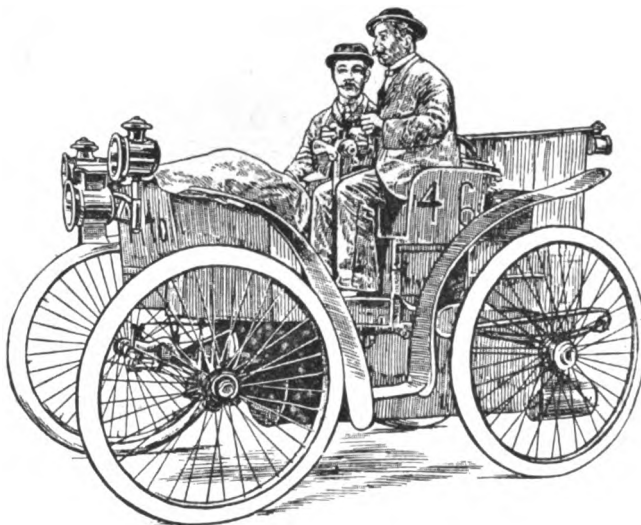
first practical pneumatic tire put on the market, a tire that was easily detached on the road by the rider, was made by Michelin, who thus earned the title in France of "Pere des Demontables"—father of detachable tires. A few years later, in 1894, his tires reached their definitive of final form, the same as are used today, both for bicycles and cars.

Michelin perfected the bicycle tire, and was also the pioneer in its application to the use of horse vehicles and automobiles. Michelin considered that having proved its worth in the service of bicycles, his tire was capable of bigger things, and that he might succeed where Thomson had failed. Michelin's first attack was made on the Paris cabs. On the 10th of February, 1896, the first cab on pneumatic tires was sent out, and so great was the success of the venture, so much appreciated was the added comfort, that by 1903 there were as many as 4500 cabs in Paris using pneumatic tires, and today it is a rare thing to see one without them.

But still Michelin was not satisfied; he sought still other conquests, and his greatest victory was to lie in widening the scope of the pneumatic tire by applying it to use on motor cars. But wonderful as was his conception, certain as seemed the advancement it was bound to give to the growing industry of motor car building, it shared the lot of all great discoveries—discouragement and apparent failure. No manufacturer would risk his car by fitting it with such apparently frail tires, but Michelin did not lose confidence; he was certain of ultimate success, and in order to give a public demonstration of what his tires could do, he had to make a car for himself. The occasion was the Paris-Bordeaux race of 1895, when Michelin was represented by a rough sort of motor car made at his own works at Clermont-Ferrand. That was the beginning. Today over half the cars in the world are fitted with Michelin tires.

The automobile of today would not have been a possibility and the automobile business could not be where it is today if this industry had fallen into the hands of pessimists—it required an optimist, one who could see visions of the future. It has attracted the most alert and skilled engineers of the world, as is amply verified by the great accomplishment in developments over a brief 15 years. Starting scarcely more than 15 years ago without either experience or precedent to guide, the automobile (horseless carriage, as we called it), such as was known at that time, was only a crude suggestion of what possibilities might lie in the idea and what was to be developed out of it.

In 1917 there were 1,903,878 automobiles manufactured in this country according to figures prepared by the N. A. C. C.



Automobile Equipped with First Pneumatic Tire, Built by Michelin and Driven in Paris-Bordeaux Race, 1895.

had been introduced, the bicycle, and the pneumatic tire was just what was wanted to insure its perfection. It was, therefore, resurrected, first in England and afterwards, with equal success, in France.

But the early pneumatic tire sold by Dunlop was far from being perfect; its worst fault was that it was not detachable, so that with the first puncture it was done for. Numerous experiments were made by different makers, but the



"The trailer idea," says H. C. Fruehauf, general manager of the Fruehauf Trailer Co. of Detroit, "is not new. In fact, it dates back to the primitive man of prehistoric times who endeavored to solve the problem of transportation by loading his goods and chattels on a sledge and dragging them.

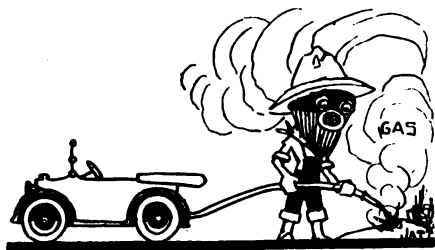
"The Aborigines of America used to place poles on each side of a horse and with cross sticks and thongs bind a load that the animal could not begin to carry.

"This idea has been passed down through the ages to the present day users of motor trucks. And in the development of the semi-trailer we have an economical and efficient solution to the heavy transportation problem.

"In utilizing the semi-trailer with the motor truck we are but applying an old idea in a new way."

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Western farmers have learned a lesson from the war and are employing gas



attacks against one of their commonest enemies, the gopher or prairie dog. Unlike the methods employed in Europe, however, the farmer derives his supply of gas from the exhaust of his engine, transmitting it through a rubber hose to the holes where the little pests live. Only a few minutes application of the deadly carbon monoxide gas to the hole is necessary to bring a painless death to the gopher.

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The big rubber companies of Akron, O., are lending the fullest cooperation in the matter of putting over the Third Liberty Loan Drive in that city. The employees of the rubber factories were extremely liberal in their subscriptions to the first and second loans. For weeks the campaign committee has been busy working out plans and selecting workers. Mr. W. D. Shilts, office manager of the Goodyear Tire and Rubber Co., is in charge of the campaign.

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The girls of the military drill classes of the Goodyear Tire and Rubber Co., subscribing to the slogan, "Food Will Win the War," are planning to culti-



vate several of the garden plots which the company is offering to employees wishing to have their own gardens this year. About 40 acres of good tillable land are available, all of which is near the plant. Before long it will be a common sight to see the girls marching to work, armed with hoes, rakes and other garden tools.

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Books with a blue cover are tabooed from now on in the life scheme of William C. Lindstrom, a wealthy importer, who arrived in New York from Porto Rico recently. The first thing he did after getting settled, he told Magistrate Cobb in the New York court, was to buy a book in which it told just what he could and could not do with his motor car. He was traveling 27 miles an hour the other day when a traffic cop stopped him and served him with a summons.

When he reached court he displayed the book to the magistrate and pointed out a paragraph which he said he interpreted as meaning he might travel 30 miles an hour in his motor car without violating the traffic regulations. The magistrate said he thought the defendant had been acting in good faith and suspended sentence.

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A recent checking up of its shop organization by the Cadillac Motor Car Co. has revealed some facts which are of especial interest at this time. Perhaps the most impressive feature developed is that in a very large measure the men who do the fine machine work on the Cadillac car have been in the employ of the company and associated with each other for years.

In the Cadillac factory are 52 superintendents, department managers and foremen who have been continuously employed by the company for more than 10 years, many of them even 15 years or longer. There are 143 others whose service is between five and 10 years. Practically all of these men, of course, are above the age limit for military service, at least so far as the draft is concerned.

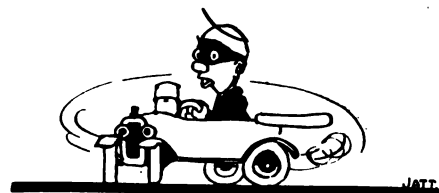
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Property owners and real estate operators have been quick to appreciate values which must accrue through the growing use of the Lincoln Highway at all points along the trans-continental route. The era of freight transportation by motor car is held by them to be of the highest importance in future developments which will be directly responsible for increased prosperity in practically every community upon the highway.

Trenton's location of the Lincoln Highway is widely advertised by local real estate operators as a reason for investing in Trenton property, the reason being advanced that Trenton real estate must constantly increase in value because of the routing of the Lincoln Highway through the city.

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The latest thing in anti-thief locks for automobiles is a device that locks the steering gear in a cramped position so that if the car is operated it can only



turn in a circle. It was probably the design of the inventor that after several rapid revolutions the thief would become so dizzy he would fall from the car and be readily captured or else that he would become disgusted upon discovering that he returned to the starting point each time and would abandon the machine where he first entered it. No great demand for this device has been reported as yet.

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W. Eugene Turton addressed the members of the Traffic Club of Newark, N. J., at a meeting held April 2, his subject being "The Importance of the Enforcement of Traffic Rules and Regulations for Motor Traffic," but the principal part of his address was devoted to the need of developing highway transportation as a means of relieving the railroads. He dwelt upon the need of reciprocal state licensing, emphasizing that if this were not granted by the states themselves the importance of road haulage would eventually lead to Federal licenses and the states would be deprived of what is now the source of considerable revenue.

Activities of Prominent Men and Other

M. E. Holmes has resigned as sales manager of the Republic Motor Truck Co., and is succeeded by C. A. Miller, assistant general sales manager. F. W. Gargott, advertising manager, and Cecil Taylor, chief engineer, have also resigned from the company.

James P. Corey has been appointed district factory representative of the Federal Motor Truck Co. of Detroit. He was formerly with the Pacific Kissel forces, distributor for the Federal truck on the coast and in the far western states.

Edward Danner, recently elected president of the Pan-American Motors Corporation, has resigned from the Agricultural Machinery Co., with which he was connected as president, and will devote his time to the former concern.

A. E. Archer has been commissioned a captain in the Ordnance Department of the U. S. Arsenal at Rock Island, Ill. He was president of the Detroit Electric Sales Co., St. Louis, Mo. Mr. Archer has appointed Frank C. Herschbach as sales manager and Herman C. Wieland as garage and service manager.

James L. Fay has taken charge of the Armleder truck sales for the Weber Implement and Automobile Co., St. Louis. He was formerly president of the Wade Mining and Milling Co.

C. M. Cunliffe has been made service manager for the Briscoe Motor Sales Co., St. Louis.

John H. Walsh has entered the firm of the Hartford Auto Painting Co. He was formerly secretary of the Donegan Auto Body and Specialty Co., Hartford, Conn.

J. A. Kingsbury is now connected with the Trego Motors Corporation, New Haven, Conn. He was formerly with the Studebaker Corporation, South Bend, Ind.

F. A. Bower, former chief engineer of the Weston-Mott Co., Flint, Mich., is now engineer of the Buick Motor Co.



Hal T. Boulden, Fourth Vice President and Director of Sales and Advertising, Selden Motor Sales Co.

H. S. McCellan, formerly general superintendent of the Chalmers Motor Co., Detroit, Mich., has been appointed superintendent of plant one of the Buick Motor Co.

Edward Maurer has become superintendent of shops of the Solvay Process Co., Detroit. He was formerly chief engineer of the Lewis Spring and Axle Co., Chelsea, Mich.

Donald Anthony has resigned as manager of the Baltimore branch of the Locomobile Co., to join the aviation corps. F. B. Wilson will succeed him in charge of the branch.

D. E. Randall, formerly general line salesman, Boston branch of the Goodyear Tire and Rubber Co., has been appointed branch manager at Providence, R. I., replacing O. C. Pahline, who is now in the Federal service. Other changes in the Goodyear organization have been announced as follows: C. B. Peschman, formerly Boston branch manager, has been advanced to the position of assistant district manager, New England district, with headquarters at Boston. W. C. Blake has been transferred from branch manager at Long Island City to assistant manager, solid tire department, at Akron. A. W. Ellis, formerly assistant branch manager at Long Island City, succeeds Mr. Blake as branch manager. H. R. Russon, formerly branch manager at Dayton, O., has become a member of the Manufacturers' Sales Organization at Detroit, Mich., specializing on aeroplane accessories. J. O. Humbert has been promoted from general line salesman, Indianapolis, to branch manager at Dayton. F. R. Hesse, formerly special representative, attached to the San Francisco district office, has been made branch manager at San Diego, Cal., succeeding G. L. Wands, now in Federal service. John Daheney, formerly staff man, solid tire department, Akron, has

been promoted to branch manager at Syracuse, N. Y., succeeding M. Orr, now in Federal service.

C. E. Williams has been appointed assistant sales manager of the Selden Truck Sales Co., Rochester, N. Y. He was at one time connected with the Velie Motors Corporation, Moline, Ill., and with the Federal Motor Truck Co., Detroit, Mich.

N. W. Barton, manager of the Chicago branch of the Olds Motor Works, has been transferred to the factory to assume the duties of eastern division sales manager. Mr. Barton is well known throughout the Oldsmobile organization, having been assistant general sales manager for a number of years.

Harry F. Prescott has been appointed sales manager of the Disco Electric Manufacturing Co. He was formerly connected with the Saxon Motor Car Co. in the sales department.

W. A. Cluff has been elected to the board of directors of the Mason Tire and Rubber Co. He is the auditor of the company. Mr. Cluff was formerly with the Union Commercial Bank and also the Reserve Trust Co. of Cleveland. He has been appointed first assistant treasurer of the Mason Tire and Rubber Co.

C. Louis Allen has resigned as president of the Pyrene Manufacturing Co. and has organized the Allen Sales Service, Inc., which will be a manufacturers' service bureau. Mr. Allen has associated with him three more Pyrene men, T. F. Flanagan, sales and advertising manager; W. H. Yetman, in charge of the fire appliance department, and D. V. Stratton, production manager.

J. F. Richman has been appointed manufacturing manager of the Allen Motor Co., Fostoria, O. He was formerly factory manager of the Cole Motor Car Co.



J. F. Richman, New Factory Manager of Allen Motor Co.



C. E. Williams, Assistant Sales Manager, Selden Truck Sales Co.

Personal News of Motor Industry in Brief

H. B. Rector has joined the H. O. Harrison Co. by purchasing a half interest in the company's branch in Oakland, Cal. He will become manager of the branch and will push the Hudson and Dodge Brothers cars and the Republic trucks. The Harrison company has been expanding, having doubled its San Francisco floor space by moving into part of an adjoining building. It has also bought the Butler-Veitch Co., Hudson and Dodge Brothers agent in Berkeley.

I. K. Schnaitter has been appointed assistant and treasurer of the Willard Storage Battery Co., Cleveland, O. He was formerly credit manager of the company. H. M. Adams has been appointed district manager, with headquarters in New York, succeeding A. W. Sayer, who has been recalled to the main office.

Owen Moynihan has been promoted by the Amazon Rubber Co. to the position of general sales manager and will make his headquarters in Akron, O. He is succeeded by Fred H. Findley in New York City.

W. H. Schwartz has located at Fountain and Union streets, Providence, R. I., as the W. H. Schwartz Co., where he has already established a distributing point for Hurlburt trucks for Rhode Island and Bristol county, Mass. He will, probably, carry a line of light trucks. Mr. Schwartz has been associated with the affairs of the industry for many years, having been sales manager of the Metz Co., and more recently branch manager of the Willys-Overland, Inc., Springfield, Mass.

Henry L. Innes has been appointed vice president of the Doble-Detroit Steam Motors Co. He will have the general management of the company. For some time he was manager of the Chevrolet plant at Flint, Mich., from which he was taken to the position of assistant general manager of the General Motors Corporation's production. Mr. Innes did much experimental work on the first model of the Dodge Brothers cars.

Frank V. Lennon has been appointed to take charge of the New England distribution of Norwalk tires. His headquarters are at 181 Massachusetts avenue, Boston, Mass.

F. E. Davis has been made the president and general manager of the Tower Motor Truck Co., Greenville, Mich. He was formerly in the engineering department of the Continental Motors Corporation.

William H. Noyes, formerly service manager of the local Oldsmobile company, has been made manager of the retail department of the Cleveland Rubber Corporation.

B. Wellheimer has been appointed general manager of the Nicholads Co., 124 Grand River avenue, Detroit, Mich. He has been engaged in the automobile and accessory stores of New York for 13 years and recently resigned his position with the "Times Square" chain of auto-



Harry F. Prescott, Sales Manager of Disco Electric Manufacturing Co.

mobile and accessory stores.

Eaton McMillan has been made sales manager of the L. H. Rose-Chalmers Co., San Francisco, Cal., to succeed Ray Elliot, who has resigned. Mr. McMillan has been connected with the Chalmers organizations since 1907 and is one of the best known and most aggressive men in the San Francisco automobile business.

Stephen D'Orlow, formerly chief engineer of the Oak Manufacturing Co. of Alma, Mich., has been appointed research engineer of the Republic Motor Truck Co.

George C. McMullen is now representing the Timken Roller Bearing Co., with headquarters in San Gabriel, Cal. He was formerly assistant plant manager of

the metal products plant at the Timken Axle Co.

George R. Beamer has been appointed Detroit branch manager of the Federal Ball Bearing Co., Poughkeepsie, N. Y. For the last 12 years he has been connected with the United Gauge Co. He will handle the work for both organizations at the same time.

L. E. Wood is now assistant chief engineer of the Mitchell Motors Co., Racine. He was formerly designing engineer of the Cadillac Motor Car Co.

John D. Wilson has been made chief engineer of the carriage division of the Packard Motor Car Co., Detroit, succeeding G. H. Brodie, who has been transferred to the aircraft engineering staff. Mr. Wilson was formerly assistant carriage chassis engineer.

Col. H. P. Bope will devote his time to private interests and has resigned his position as vice president and sales manager of the Carnegie Steel Co., Pittsburgh, Pa. He is succeeded by William G. Clyde.

Fred R. White has been elected president of the Baker R. & L. Co., Cleveland, O., succeeding Charles L. F. Wieber. Mr. White was formerly first vice president of the company. E. J. Bartlett has been elected first vice president and general manager.

H. W. Bundy has resigned as manager in charge of the stamping division of the Motor Products Corporation, Detroit, and was formerly factory manager of the Diamond Manufacturing Co. before its consolidation with the Motor Products Corporation.

Herbert A. Jackson has been elected president of the Chicago Pneumatic Tool Co., Chicago, to succeed W. O. Duntley, resigned. Mr. Jackson was formerly associated with the Bethlehem Steel Corporation.

W. E. Dermody, for several years manager of the branches of the Goodyear Tire and Rubber Co. in various parts of the South, has been appointed manager of the Boston branch as successor to C. B. Peschmann. Mr. Peschmann becomes assistant manager of the New England district. Mr. Dermody started with the Goodyear Co. in 1911 as salesman in New Orleans and the following year was made field manager of the central division of the solid tire department at Akron, and from there was appointed manager of the Nashville, Tenn., branch, and then he was promoted to a larger branch at New Orleans.

Frederick Dickinson has been appointed as assistant sales manager of the Hupp Motor Car Corporation to succeed Harry E. Westerdale, who will become associated with the McCord Manufacturing Co. of Detroit, in charge of a new department. Mr. Dickinson has been advertising manager of the Hupp organization for the past three years and in his new position will continue to have charge of the corporation's advertising in addition to his other duties.



J. D. Maxwell Takes Up Work in Council of National Defense.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration

The Republic Motor Truck Co., Alma, Mich., announces that in the nine months ending April 1st it has built and delivered 11,400 trucks as against 5900 during the same period last year. The cash receipts were \$12,000,000, which is about twice as much as the receipts for the same period last year. Lafayette Markle, vice president of the firm, declares the schedule of production at present is 80 trucks a day.

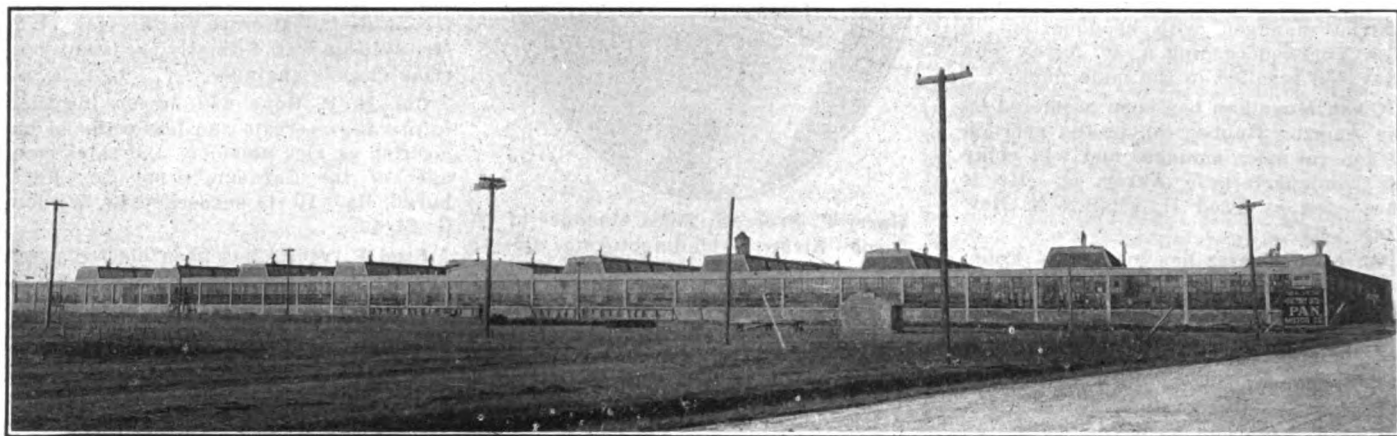
The Chandler Motor Car Co., Cleveland, O., during the first quarter of 1918 manufactured 2000 passenger cars, as compared with 4400 in the corresponding period of last year. The earnings of the company for the last three months are estimated at the annual rate of \$26.75 before the deduction of war taxes. The company has a \$10,000,000 tractor order from the government.

The United States Rubber Co. during

ance aggregate approximately \$500,000.

The United States Auto Gearshift Co., Eau Claire, Wis., which is having its hydraulic gear shifting device manufactured by the Eau Claire Manufacturing Co., has let contracts for the erection of the first unit of its new plant.

The Continental Motors Corporation, Detroit, Mich., has purchased a block of property and will add 34 acres to the property. This brings the total to more



Recently Completed Plant of the Pan Motor Co., St. Cloud, Minn., 624 Feet Long by 170 Feet in Width. When Completely Equipped Will Have Capacity of 100 Assembled Cars a Day.

The Kelly-Springfield Tire Co., Springfield, O., has declared a quarterly dividend of \$1 a share on common stock, payable May 1 to holders of record April 15.

The Power Truck and Tractor Co., Detroit, Mich., has incorporated with a capital stock of \$2,500,000. The company will manufacture one, two, 2½ and five-ton trucks in which standard units will be used. It will also manufacture two tractor models. The one-ton model the company has adopted is now being placed on the market, having been in use for a year and a half. The company plans to build 3000 trucks and 3000 tractors during 1918.

The De Martini Motor Truck, San Francisco, Cal., has put on the market four models of worm driven trucks of one, two, three and four-ton worm driven capacity. All four units are equipped with Buda engines, Brown-Lipe clutches and Brown-Lipe gearsets mounted in unit power plants and Sheldon worm driven rear axles. The one-tonner has a 3¼x5½ engine, the two-tonner a 3¼x5½, and the three and four tonners a 4¼x5½. In the chassis the one-tonner sells at \$2250, the two-ton unit at \$2750, the three-tonner at \$3650 and the four-ton model at \$4250.

The Saxon Motor Car Corporation, Detroit, Mich., has on its books 2300 unfilled orders. The reason for not filling the orders is due to the lack of raw material and parts.

1917 sold over \$55,000,000 worth of tires as compared with less than \$40,000,000 in 1916. During the first three months of 1918 the sales showed a gain of 40 per cent. as compared with the corresponding period in 1917. The total sales of the company in 1917 were \$176,159,694, of which \$31,243,053 was operating profit and \$15,340,577 surplus applicable to dividends.

The Reo Motor Car Co., Lansing, Mich., produced 735 trucks during the month of March as compared with 325 in the same month of 1917. On April 15 the company was 1119 trucks behind in orders and the present output of 50 per day will be increased to meet the demand.

The Chevrolet Motor Co., New York, will move its manufacturing, sales and accounting activities to the company's factory at Tarrytown owing to the difficulties that have arisen on account of the freight congestion. The New York City sales room and service station will be continued.

The Gillette Rubber Co., Eau Claire, Wis., makers of the Gillette safety tire, is erecting a two-story stock room, warehouse and shipping building, 65x150 feet, to cost \$35,000. The structure will be ready for occupancy about June 1st.

The Haynes Automobile Co., Kokomo, Ind., has taken out a blanket insurance policy covering the lives of all employees who have been with the company for six months or more. The premiums on insur-

than 50 acres. The plant will be enlarged in the near future.

The Cadillac Motor Car Co., Detroit, Mich., has advanced the prices of many models as follows:

Model	New Price	Old Price
Open cars		
7-passenger.....	\$2970	\$2805
4-passenger.....	2970	2805
2-passenger.....	2970	2805
Closed cars		
Brougham		
5-passenger.....	\$3840	\$3650
Victoria.....	3365	3205
Chassis		
125-in.....	\$2490	\$2345
132-in.....	2570	2425
145-in.....	2610	2465

Prices of limousines, imperials, landaulets, town limousines and town landaulets remain the same.

The Bridges Motor Car and Rubber Co., Fort Worth, Tex., will erect a factory within a few months on a site of 289 acres which is being cleared. The plant will comprise several buildings.

The Kissel Motor Car Co., Hartford, Wis., has discontinued the manufacture of its three-quarter-ton bevel-driven Flyer delivery vehicle. In its place it has added a new worm driven five-tonner called the Dreadnaught, with a chassis capacity, including the body, of 11,800 pounds.

The Gray Motor Co., Wilmington, Del., has increased its capital stock from \$550,000 to \$1,000,000.

The Olds Motor Works, Lansing, Mich., will increase the price of its eight-cylinder open models to \$1550. Prices of six-cylinder models will probably remain unchanged. The open models listing at \$1195, the coupe at \$1595 and the sedan at \$1695.

The Studebaker Corporation, Detroit, Mich., has increased the factory prices of its models and are as follows: The four-cylinder, formerly \$895, now \$995; six-cylinder light touring, formerly \$1295, now \$1395; big six touring, formerly \$1695, now \$1795; four-passenger roadster, \$1450, now \$1550; chassis, formerly \$1200, now \$1295.

The Harroun Motors Corporation, Wayne, Mich., has received an order for a large quantity of 155 mm. shells, and is now installing \$500,000 worth of new machinery to produce them. Vice President Ray Harroun is devoting a major share of his personal attention to the revision of plant arrangement.

The Mohawk Rubber Co., Akron, O., has increased its capitalization from \$1,050,000 to \$2,050,000. The company has voted a 20 per cent. stock dividend to stockholders in addition to the 2½ per cent. cash dividend on common stock.

The Gillette Rubber Co., Eau Claire, Wis., is erecting a two-story stockroom, warehouse and shipping building. The company plans to have the unit ready by June.

The United States Rubber Co. has declared a regular quarterly dividend of two per cent. on the first preferred stock, payable April 30, to stock of record April 15.

The Fisher Body Corporation has declared the regular quarterly dividend of 1½ per cent. on preferred stock, payable May 1 to stock of record April 20.

tract with the Eau Claire Manufacturing Co.

The Kissel Motor Car Co., Hartford, Wis., has appointed the following dealers as distributors of KisselKars: G. W. Burgess, Joplin, Mo.; W. C. Keith, Mayview, Mo.; H. P. Liggett, Wheatland, Mo.; R. N. Montgomery, Rich Hill, Mo.; McTyeire Harris, Dearborn, Mo.; J. R. Puckett, Gower, Mo.; Pleasant Hill Garage, Pleasant Hill, Mo.; E. Shepherd, Missouri City, Mo.; C. M. Tamer, Hume, Mo.; O. S. Taylor, Clinton, Mo.; O. C. Walker, Lathrop, Mo.; G. E. Weaver, Pattonsburg, Mo.; J. H. Collinflower, Canton, O.

Electrical Testing Co., Peoria, Ill., has let their new building to Mr. Paul Muhlenbeck. It will cost approximately \$15,000. The building will be used for an electrical service station for handling service work on storage batteries and on electrical apparatus used on the gas car.

The Sewell Cushion Wheel Co., announces that for the first three months of 1918 sales of their special fire department type of cushion wheels show over 100 per cent. increase over the same period last year. In addition to cities having specified "Sewell wheel equipment" on new motor apparatus ordered, a large number changed over to Sewell wheels, motor apparatus they had in service on other equipment.

The Mohawk Rubber Co. factory at Akron, O., has a distinctive war-time appearance, as for certain forms of light work women have been employed the past six months, replacing men called to the colors, or transferred to other departments. They have been found the equal, if not the superior, to the men for the tasks in which they are engaged.

a capital of \$1,000,000 to manufacture tractors.

The Packard Motor Car Co. will put on the market 400 four-ton trucks in July. The company has not produced trucks of this model for over a year and a half.

L. V. Flechter & Co., Long Island City, N. Y., are now located in the plant of the Neptune Motor Co. at 192 Jackson avenue. The new plant has the capacity for manufacturing more than 2500 carburetors a day.

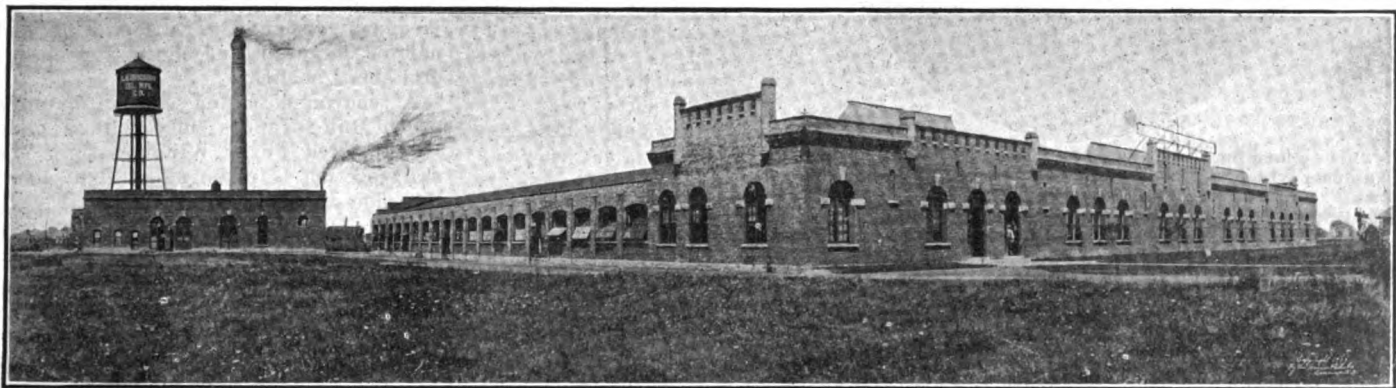
The Automotive Manufacturing Co., Detroit, Mich., has been incorporated to manufacture universal joints, pressed steel parts, steering links, ball and socket joints. About 90 per cent. will be government work. The company now occupies a temporary building. Its new plant will be completed by July 1. The officers of the company are: D. I. Shaw, president; George Buchler, vice president; Joseph H. Smith, secretary.

The Cleveland Tractor Co., Cleveland, O., will produce 10,000 machines during this year. An addition 60 by 250 feet, a new factory building 60 by 450 feet, a boiler and hardening room 80 by 90 feet and an annex to this of 90 by 200 feet were erected during 1917.

The Lobell-Aborn Co., New York, N. Y., who has been handling the used car department for the Maxwell Motor Sales Corporation for the past two years, has taken over the used car department for the Chalmers Co.

The Collier Motor Truck Co., Bellevue, O., has increased the price of its model M, three-quarter-ton truck, \$100. The new price for the truck complete with body and electric starting and lighting system is \$985, and the chassis price \$935.

The Carolina Aircraft Co., Raleigh, N.



Large Modern Factory and Power Plant of the Ericsson Mfg. Co., Buffalo, N. Y., Where Berling Magneto Is Manufactured.

The Denby Motor Truck Co., Detroit, Mich., has completed three new assembling plants. Every Wednesday a fleet of trucks leaves the factory and are loaded to capacity, taking five days on the trip to New York. The number of drivers has increased to 10 and if competent drivers can be obtained this number will be increased.

The United States Auto Gearshift Co., Eau Claire, Wis., has commenced the erecting of the first unit of its new plant. The company is now manufacturing a hydraulic gearshift device under con-

The Mohawk factory girls wear khaki bloomers and are not adverse to posing for the photographer. The plant is now running at top-notch capacity.

The Columbus Tractor Co., Columbus, O., has elected Foster Copeland as president; Fred A. Miller, vice president; George H. Barker, secretary; E. R. Sharp, treasurer; Marion McIntyre, sales manager. The executive committee is composed of Walter A. Jones, Foster Copeland, Fred A. Miller, George H. Barker and Hugh Ridenour. The company was recently incorporated with

C., has been organized with a capital of \$500,000. The stockholders are Harry N. Atwood, Howard White, John A. Park, J. M. Broughton.

The Standard Crucible Steel Co., Milwaukee, Wis., is erecting a foundry addition to increase its casting production as required by unfilled orders. The additional facilities will be ready about May 15.

The Bergie National Spark Plug Co., New York, N. Y., has opened an eastern sales branch in the Buick building, 1737 Broadway. R. M. Hodes, the company's eastern territory manager, is in charge.

Silks and Satins Save for Soldiers

The Garments of Loyalty

war gardens and otherwise doing everything in our power to aid conservation so that we may one day triumph over the beastiality of the Hun. We are told constantly that the woman who wears wool in abundance is robbing the soldier of his due and that it is her patriotic duty to wear silk, and this lovely material has been advocated to an unprecedented extent. Can any woman in her fondest imagination conjure up a more thoroughly delightful duty than the wearing of silk?

Our American manufacturers of silks have given us some wonderful products, both in beauty of coloring and design, and also in durability and variety. A great many of the silks designed especially for motor and sports wear, will go through a hard season and give every satisfaction. There are those which will tub excellently and repeatedly and present their original charming appearance, while all will

clean most satisfactorily. There are some very beautiful weaves in the new silks which were once thought to be obtainable only in the long-established silk producing centres of Europe.

In purchasing silk, or garments made of silk, the most important thing for the woman motorist to know is how to make her selection to ensure the most satisfactory wear and give her the best results. There are, of course, silks and silks. Some which will outwear cotton or wool fabrics, while there are others not to be depended upon. I am going to tell you of some silks that are to be entirely depended upon and which are particularly adaptable for motoring garments. The excellent features of these materials have been personally explained to me by their manufacturers and nothing better can be obtained.

Roshanara Crepe, Khaki Kool, Ruff-a-Nuff, Amphora and Indestructible Voile are the materials which particularly lend themselves to the garments for the motor woman's wardrobe and may be very successfully used for coats, frocks, skirts, blouses, millinery and bags. A new raglan motor coat is of brown Roshanara Crepe with a broad belt, convertible collar and a very wide, single box pleat, which gives much chic to the back. This model is warm enough for early spring wear and roomy enough to allow a sweater to slip under if required. Another model of Roshanara Crepe in a beautiful dark red shade is made in a Spanish effect. It is three-quarter length, with a back which is moderately full and ripply. A round collar is pleated and fastens on the left shoulder with a buckle. Very large armlets finish with a straight cuff. A motor coat of tan Roshanara has a panel back slightly gathered at the waistline, fronts half fitted and a deep shawl collar. There is a shallow round back yoke cut in with the fronts. The skirt section is cut out to the hipline on the sides. A full length coat of gray Roshanara is combined with Satin Faced Poplin in a darker shade of gray. The body of the coat is Roshanara Crepe with a deep hem of the Poplin; both the waist and skirt section are slightly gathered at the waistline. The waistline is defined with a straight Poplin belt. There is a broad collar shirred at the neck and long, tight sleeves with turnback cuffs which are edged with a band of the Poplin. Roshanara Crepe is a heavy silk with a very crepey effect. It comes in the plain and three patterns of jacquard design—the stripe, wide and narrow, large dot and check, and in several smart shades.

A charming motor coat of hunter's green Ruff-a-Nuff is lined with a plain rose colored Pussy Willow satin. The skirt section is made on straight lines, the side seams being bound with self-



This charming motor model has the popular slip-on blouse, which is one of the most practical and most likeable of all outdoor models and then it's so flatteringly youthful, too. Made of white Roshanara Crepe and belted and collared in navy blue Roshanara Crepe, which has been stitched to simulate quilting. The chic little hat is a corded affair decorated with worsted flowers.

Suit from J. M. Gidding & Co., N. Y. City. Posed by Catherine Stout, the "Flo-Flo" Girl.

By MRS. A. SHERMAN HITCHCOCK.

UNTIL within a decade or so ago the garment of silk was synonymous with the "very best dress or coat," and the little girls of a generation ago were told that no one ever wore silk garments for "everyday" except princesses. We all remember the nursery rhyme about the young woman who sat on a cushion and wore a silken dress while she sewed a fine seam and fed upon strawberries, sugar and cream. Her luxuriousness was impressed upon us by the fact that she was clad in silk—probably today we would be far greater impressed by knowing she had sugar and cream on her strawberries. But the garment of silk is today considered a badge of patriotism and is classed with our daylight saving, eating corn bread and potatoes, tending



Smart model showing the very newest type of veil, the Chenille bordered, circular Lederer veil of mulline, which Dame Fashion has decreed as being the most approved of all veils. It may be had in taupe, negre brown, purple, navy, black and white. Brown is the smartest of all. Courtesy Herbert B. Lederer Co., New York City.



When the youthful motorist goes to the Country Club or to the Casino this season she may wear a costume of this character and feel assured that her appearance is absolutely correct. The smart skirt is of Hero Crepe Batik, one of the very newest and most exclusive fabrics. Her sleeveless jacket is of black velvet and her tailored blouse is of white Pussy Willow satin. The hat, too, has some of the Hero Crepe Batik in its makeup. Courtesy B. Altman & Co., N. Y. City. Posed by Florence Shirley of "Oh, Lady, Lady."

colored silk braid. It is full length and has a cape back and is button trimmed full length on the sides. The front is plain. There is a standing military collar and a narrow belt across the front at the normal waistline. A new motor cape model in sleeveless style is made of blue Ruff-a-Nuff and is trimmed with bands of sand Ruff-a-Nuff. It is almost tight fitting with a very slight fullness at the shoulder and has a broad shawl collar of the convertible type. Another smart motor cape of natural Ruff-a-Nuff has the waistcoat front and cape back. There is a broad belt passing through slits on the front and a few inches from the bottom all the way around are diamond shaped medallions embroidered with black wool. Ruff-a-Nuff is one of the new rough silks which are in such great demand this season and this particular silk is a strong leader. In the white and natural shades it is guaranteed to launder perfectly. There is an irregularity or roughness in the weave which gives it much distinction and it may be had in all the new spring colors.

There are probably but few motor women who are not familiar with Khaki Kool as one of the most attractive and durable of all the sports materials, and this season's designs and colorings are more beautiful than ever. There are also some clever faconne effects, that is, self tone jacquard designs. The Batik printings which is a new and decidedly popular idea this year—the application to machinery of the hand wrought art of the Javanese with their wax printing—is introduced on Khaki Kool and is wonder-

fully effective. The Batik designs also come in the Pussy Willow silks and Indestructible Voiles.

Amphora is another rough weave and is slightly heavier than the Ruff-a-Nuff. It will in the white and natural shades launder well and will wear well. The Indestructible Voile makes the most ideal motor dresses for warm weather wear. It is of gossamer fineness, broadcloth strength, and comes in an indescribable variety of marvelously beautiful patterns not found in any other fabric. A dress of this material will neither wrinkle or crush and nothing smarter could be found for the motoring tourist.

A motor dress of dark blue and white Indestructible Voile is made on the smart straight lines. The waist has a broad pleat over the shoulders, forming a panel, which hangs straight in Chinese style. There are four loose panels on the skirt and all the panels are decorated on the hems and across the bottoms with rows of black chain stitching. On the centre front and back at the raised waistline is a very narrow and loose belt embroidered with yellow, green and black beads. Short, wide sleeves are edged with beads and stitching. The roll collar is of yellow organdie.

The back button frock is seen in a



It's a very smart and clever masculine touch that the waistcoat gives to this severe little motor suit and incidentally it stamps it at once as a 1918 creation. The suit is built of blue self-tone checked tricotine and the waistcoat is of gray Roshanara Crepe, as is also the collar, which takes on revers airs and extends to the very bottom of the coat front. The smart new straw sailor is topped with crepe also.

Suit from J. M. Gidding & Co., N. Y. City. Posed by Catherine Stout of "Flo-Flo" Fame.



The motor coat of silk is practical, attractive and patriotic these days. This model is of Khaki Kool in the natural shade, the color that defies so successfully the dust and other stains of motor travel. The draped collar and the lining is of rose tinted Pussy Willow silk. Coat Designed by Beck & Conhalm, New York City.

number of motor models. But there is a secret connected with it—it really fastens in front, but has one guessing as to how it is put on. Khaki Kool makes the most charming one-piece dresses of this character and the plain colors are quite frequently combined with those of printed pattern. Motor models are designed to give the greatest degree of comfort consistent with good dressing. Practically all of them have sashes, are exceedingly plain and built on straight up and down lines. The more elaborate ones have a tunic or half tunic and occasionally there are trimmings of self-stitching. They have both high and low collars, with preference given to the latter. For the motor dress the most popular colors are browns, tans and beige, but there are many modish and charming shades, always in tones to defy dust and other motor soil. Those with cut-away neck are finished with rolling collars of wash satin, organdie or batiste, easy to launder. An attractive model in white Ruff-a-Nuff is buttoned in the back. The white pearl buttons extend from the neck to the hem of the skirt. They are quite large buttons and the button holes are bound with the dress material instead of being worked with silk, so they are much easier to handle.

A delightful little motor hat is made of folds of Field Troop Roshanara Crepe and could quite easily be made by any motor woman who is handy with her needle. The folds are caught together, every other one with a vertical brown floss thread.

PLATE XXI.

CONCRETE GARAGE, WITH WOODEN ROOF

Permanent Type of Structure That Is Practically Fireproof
and Calls For Minimum Expense of Maintenance and Repair

Designed by the Architectural Department of the Automobile Journal.

IN THE accompanying plan the design for a solid, substantial, permanent type of one-car garage is shown. Such a structure appeals to the man who wants a building that, while involving a slightly higher first cost than the average, will continue to give the maximum of satisfaction and service for a life time without incurring any material expense for maintenance or repair. Built of solid concrete with wall reinforcements of twisted iron bars set perpendicularly and horizontally forming foot squares, this structure improves with age so far as stability is concerned, and with seven large windows and spacious entrance the requirements of cement are greatly reduced.

Sectional moulds should be built which can be used for casting the foundation walls as well as the main walls. These moulds or forms can be made either the full height of the walls or in four-foot sections, and should be constructed of one-inch matched boards stiffened on the outside with 2x4 inch joist to hold them in true shape and prevent bulging. The foundation walls, which have outside dimensions of 16x19 feet, should be 10 inches thick, extend at least 38 inches below grade and have a footing at the bottom at least 15 inches width. The mixture for this construction should consist of one part good cement, 2½ parts of clean sand and five parts of sharply broken stone, gravel or slag. The foundation should extend eight inches above grade to form an underpinning for the main walls, which should be at least nine inches thick, and constructed of a mixture of one part cement, two parts sand and four parts stone or other coarse aggregate. The forms should be set on the foundation walls and care should be taken in making the purings. Once the work is started it should be continued until finished so that the lines where various castings come together will not show. The door and window openings should be placed in the forms while casting and bolts with their heads in the cement should be placed along the sides of the door opening to secure the wooden door jams from which the doors are swung.

At the time the foundation walls are hardening it is a good plan to lay the concrete floor. For

this purpose the ground should be either rolled or well tamped and a four-inch base of concrete laid of one part cement, 2½ parts sand and five parts stone. Over this is cast the finishing layer, which is of one part cement and two parts sand.

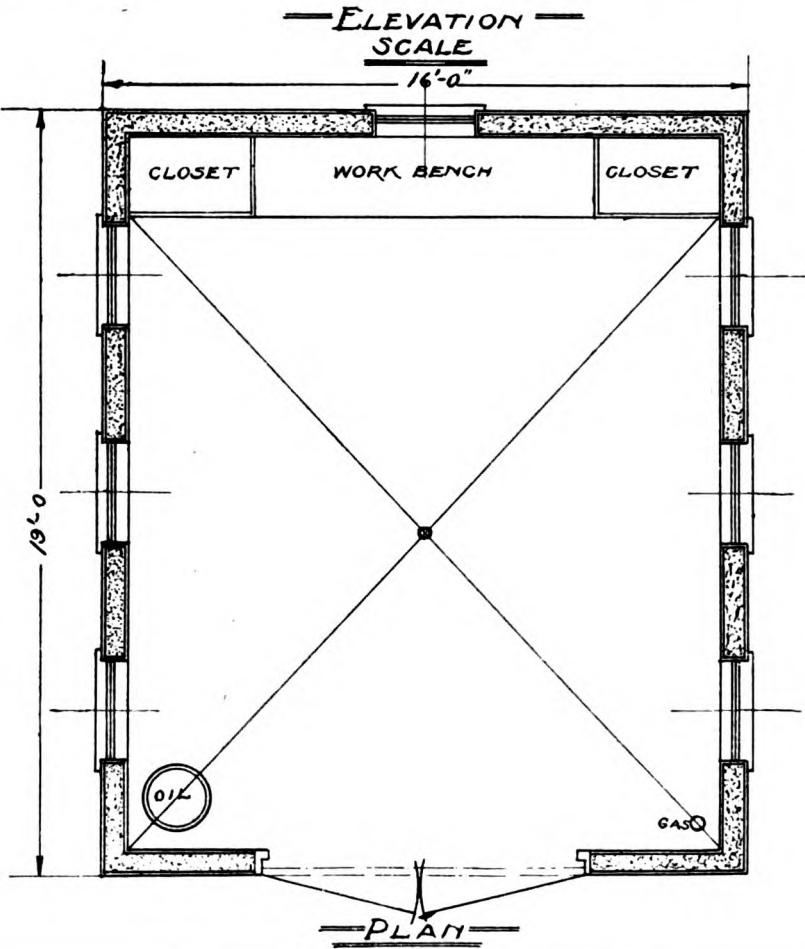
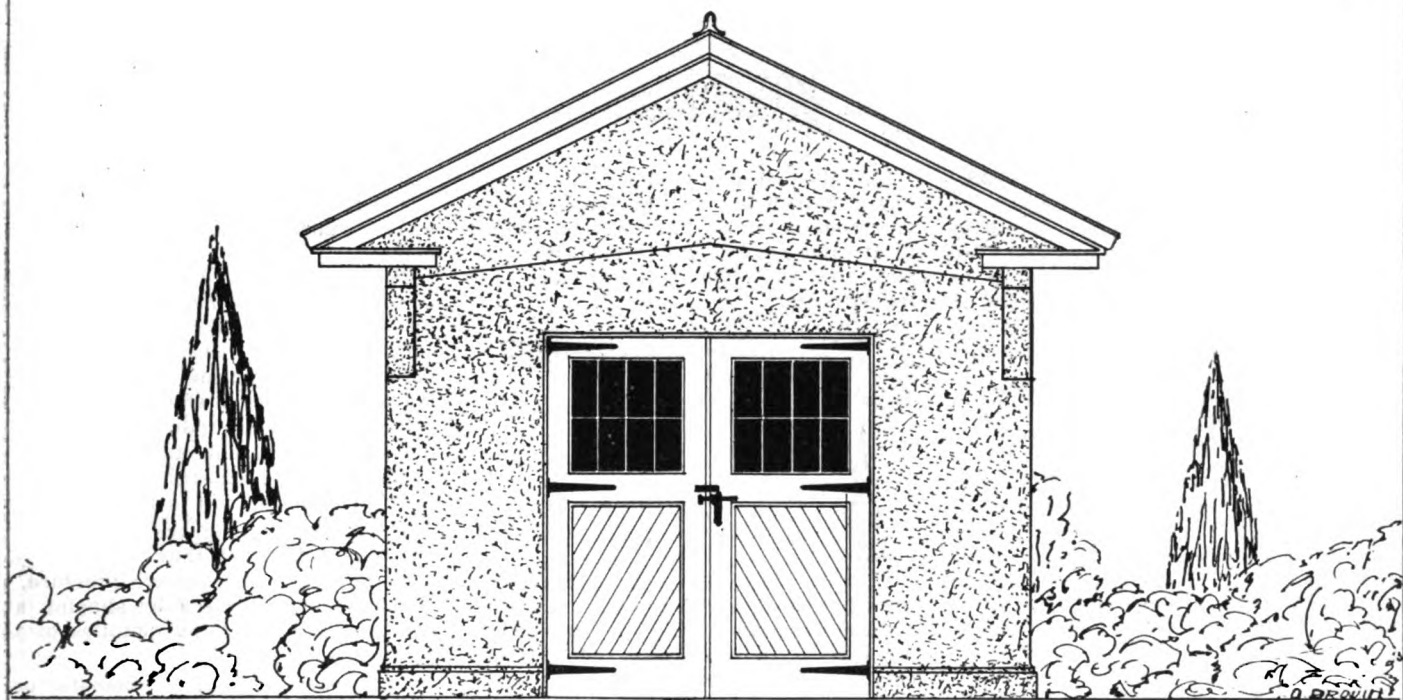
Well mixed concrete will harden with age, but cracking in concrete surfaces often occurs and it is difficult to prevent. It is caused by the presence of moisture which in winter time collects in the pores and freezes. The freezing action exerts pressure on the surrounding concrete and causes tiny cracks to appear. These cracks fill with moisture and the chipping action continues until spring. One way to prevent this destructive action is to thoroughly coat the surface of the concrete with a floor dressing paint. This coating preserves the texture and individuality of the concrete and prevents all moisture from penetrating the surface. If new concrete floors are covered with two coats of this paint and recoated at intervals of about six months the concrete surface will remain unscarred and without cracks.

Bolts should be cast in along the top of the walls to secure the plate upon which the roof frame is erected. This frame consists of 2x6 inch rafters laid 24 inches off centres, covered with hemlock roof boards laid three inches apart and thatched with extra shingles laid four inches to the weather.

The main entrance is closed with a pair of swinging doors, 4x9 feet by 2¾ inches thick, with an eight-pane sash in the upper panel. The doors are constructed of white pine stock and swung and equipped with a Stanley set "A" garage door outfit, which includes three pair of ball bearing hinges, one pair of door holders, top and bottom locking Cremone bolt with staples, extra heavy Duplex latch padlock hasp or six-inch extra heavy cased bolt. Reliable hardware on the doors is most essential, as this part of the structure is subject to the greatest deterioration and wear, unless properly fitted.

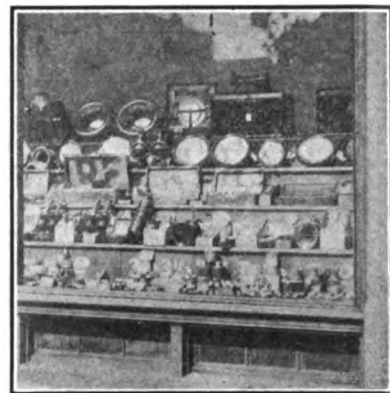
This type of building would vary in cost in accordance with the accessibility of the material and outlay for labor, but when complete and ready for use it should not represent an expenditure of over \$800.

PLATE XXI



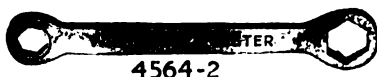


Accessories Department

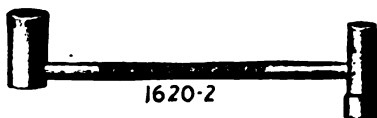


SPECIAL WRENCHES FOR FORDS.

These steel socket wrenches have been tried out by garage repair men and Ford owners. They have been found to be most efficient tools—especially useful in getting at nuts and bolts inaccessible to ordinary open-end or monkey wrenches.

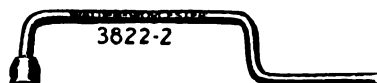


The ratchet wrench with an 11/16 inch hexagonal opening was particularly designed for use on transmission bands (brake and reverse), Ford car. The opposite end, 15/16 inch, is for use on Champion X spark plugs and slow speed netting lock. The price of this tool is 90 cents.

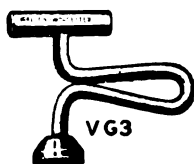


The Triple Socket Wrench is really three wrenches in one. The socket sizes are 5/8 inch and 1 1/2 inch hexagon and 9/16 inch square. This is our new improved "Tomahawk" wrench.

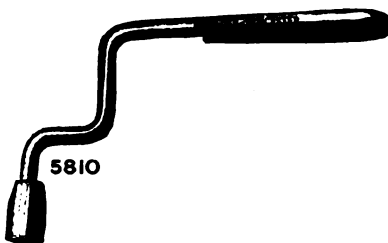
The double end socket has been designed particularly for clearance around cylinder head bolts and other places. Used on cylinder head, brake and reverse support, cylinder inlet and outlet connections, differential case, drive shaft roller bearing, front spring tie, spring, run board fender, rear axle housing, crank case (lower cover), controller shaft bracket and 9/16 square socket on main bearing bolt head. The price of this tool is 60 cents.



The special type wire handle wrench is used on flywheel cap screws, Ford car; heretofore considered an impossible place for a socket wrench. It is an ugly place made easily accessible. The socket size is 11/16 inch hexagon. It sells for 50 cents.



The all-steel wire handle valve grinder has a 3/4-inch bar handle which swivels on a cone bearing. The socket is shaped to fit valve heads and is fitted with hardened steel pins. The valve grinder sells for 45 cents.



Wrench No. 5810 is a specially designed connecting rod wrench. It fits all connecting rods on a Ford car—including the fourth connection. This is the original design—the first wrench made to reach the fourth connection without removing the engine from the car. It sells for 45 cents.

Manufactured by the Walden-Worcester Inc., Worcester, Mass. Write for catalogue.

CORK INSERT LININGS.

The cork insert lining was originated to make the planetary transmission easier of operation and more efficient through the elimination of slipping and in addition it also has been found to give many times the service life.

The lasting service of these linings is due to the gripping and wearing qualities of the cork inserts.

In the higher grades of transmission fabrics, buttons of cork are inserted at regular intervals. The corks are slightly thicker than the fabric itself and, therefore, make the first contact with the transmission drums. Because of the high coefficient of the friction of cork

and steel the response to the pressure of the brake or speed pedal is immediate and a smooth, velvety stop or start is made.

The makers claim that ordinary transmission fabric, on the other hand, loses its power to give efficient service after a short period. It becomes polished and hard surfaced from the friction, the soaking of oil and the pressure. It does not grip except when a powerful amount of pressure is exerted, and then it grips suddenly and a chattering, lurching or shaking start or stop is made.

The corks prolong the life of transmission lining, as they eliminate the wear and tear of excessive pressure, of burning friction caused by slipping and because of the wearing qualities of the cork itself.

Cork Insert Linings are manufactured by the Advance Automobile Accessories Corporation of 56 East Randolph St., Chicago, Ill., and retail at \$3 per set of three.

EUREKA GRINDING COMPOUND.

Valve grinding is not a tedious or very dirty job when the right method and the best grinding compound is used. Grinding of valves is periodically necessary, in order that the engine will not lose compression and power. A poorly seated valve or one pitted with hard carbon will not perfectly perform its function. The exhaust valves require regrinding and reseating oftener than the inlet valves, as they are surrounded by an intense heat that often causes warping.

To secure the most satisfactory results in grinding valves the user should be careful to select a well tried out compound. The Eureka compound is extensively used by both garages and owners. Its sharp and true cutting properties enable even a novice to perfectly grind valves, according to instructions furnished with each package. It is put up in two sizes, a one-pound can for garages retailing at \$1.20, and a convenient package for car owners to carry in their tool boxes, which contains three grades: Coarse, medium and fine. Retail package, 40 cents.

J. H. Faw, Inc., 41 Warren St., New York City, are the wholesale distributors.



Complete Set of Cork Insert Transmission Lining with Fastenings for Ford Car.

B. & W. MAGNETO TESTER.

A device of special value to garage and repair men is the tester for Ford magnetos. Making it easy to test Ford magnetos without removing the magneto from the engine, it instantly checks up and indicates any trouble.

The tester consists of a properly designed reactance coil and an alternating current ammeter, all mounted in a neat wooden case. The scale of the tester is calibrated to show the proper strength of Ford magneto on any model.

The tester serves its greatest purpose when the engine is on the bench. It enables one to get the magneto perfect before reassembling the engine in the chassis. This is done by grounding one of the leads of the tester to the engine and holding the other lead to the contact of the coil frame with the fingers. The other hand revolves the flywheel. This can be done fast enough so that the tester will give a steady, accurate reading.

Other tests can be made quickly and accurately by running the engine at any moderate speed, without disassembling, and the tester will indicate the exact condition of the magneto.

Manufactured by the Ballman Whitten Co., 4414 Olive St., St. Louis, Mo. Price, \$10.00.

SUNDERMAN CARBURETOR.

The Sunderman Carburetor is the result of 25 years of application and experience toward the development of efficiency in the internal combustion engine.

The air is introduced into the mixing chamber at right angles to the inflow of gasoline. The rapid draught of the fuel from the jets, because of the high vacuum created by its design, causes the gasoline to break up into fine globules and the inrushing air not only mixes with them, but causes a still more minute separation of the particles. The saving claimed by the manufacturers is said to be from 30 to 50 per cent. in the amount of gasoline consumed. It works on the multiple jet principle—two jets—one for low and one for high speed, the latter operating only as the engine suction demands.

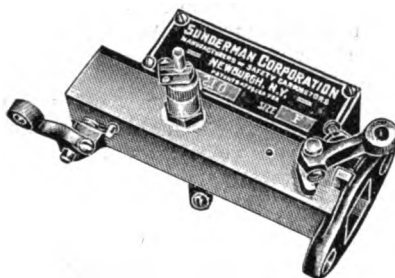
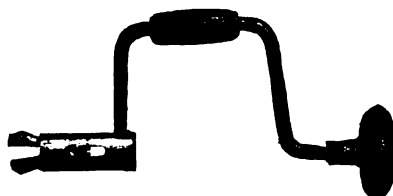
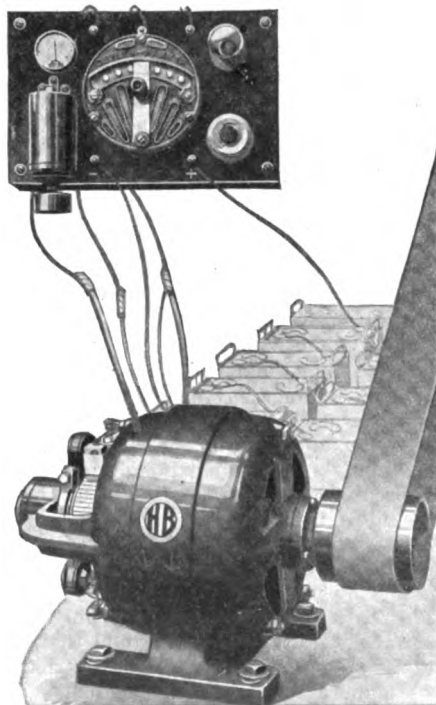
Manufactured by the Sunderman Corporation, Newburg, N. Y. Write for literature and prices.

UTILITY RIM WRENCH.

A most serviceable and attractive wrench is the new improved Utility Universal Rim Wrench.

It is light, compact and easily fits into the tool box without folding. The brace is nickel plated, the tube contains jaws finished in black enamel and the handle corresponds. The jaws are heavy and practically unbreakable and will take every size of nut used on every make of rim. It has a wide range of usefulness and can be used as a general service wrench as well as a rim wrench.

Manufactured by the Hill Pump Valve Co., Chicago, Ill. Price, \$1.50.

**Magneto Tester.****Sunderman Carburetor.****Rim Wrench.****H. B. Belted Charger.****THE H. B. BELTED CHARGER.**

An ideal capacity battery charging outfit for the service station and garage that does not have electric current, or use gas engine power, is manufactured by the Hobart Bros. Co. of Troy, O.

The H. B. Belted Charger will charge seven six volt batteries or their equivalent at one time. It operates from a line shaft or engine, requiring one actual horsepower to operate. The switchboard is furnished complete ready for use with ammeter, pilot light, field rheostat, circuit breaker and necessary fuses and cutouts. This charger is sold on easy terms, which enables the garage man to buy a dependable ample capacity battery charger with the profits from each month's business.

Manufactured by the Hobart Brothers Co., Troy, O. Write for prices and literature.

THE SUPER SPARK.

This device creates a rush on high pressure current which jumps the spark gap, increasing the voltage and decreasing the amperage.

The base cup is constructed of steel, having a point on the inside centre, projecting upward to meet the center pin and threaded on the upper inside to receive the insulator. The center pin is tapered at the lowest point to meet the point in the base cup, being held by an insulator. The outside lower part is threaded to fit the base cup and the outside lower portion is air tight. At the top of the pin is a hexagon nut that serves to lock the pin after the adjustment has been made. With the Super Spark Transformer taking the pull from the platinum points, coil and condenser, it prolongs the life of the battery and prevents engine missing, caused by the plugs being flooded with oil and carbon deposits.

Manufactured by the Super Spark Co., Detroit, Mich. Price, \$2 each.

"PROPER CARE OF YOUR CAR."

Quite in line with the nation's plan of conserving and preserving is the attractive 24-page booklet, "The Proper Care of Your Car," published by the Northwestern Chemical Co. of Marietta, O., manufacturers of the "Chemically Correct" line of Northwesco utilities.

This booklet is chuck full of practical hints for the motorist. It tells how to overcome and to correct some of the different ills a motor car is subject to. Unlike some booklets it gives more than one remedy for correcting the most common troubles. In fact, it tells just what its name implies, "The Proper Care of Your Car."

It is well illustrated and any motorist will find it serviceable and helpful. The readers of the Automobile Journal can secure a copy postpaid by writing the Northwestern Chemical Co. of Marietta, O.



Stevens Tool Cabinet.

STEVENS HANDY TOOL CABINET.

A cabinet designed as a result of a demand on the part of repairmen for a compact section in which they could keep, for instant use, such of the smaller tools as are handled during the course of the day's work, has been recently placed on the market.

Each of the drawers can be sub-divided into smaller sections by means of wood divisions, supplied by the company, so that the cabinet can be immediately adapted for the stocking of small electrical equipment, such as bulbs, generator and motor parts, etc.

This cabinet will last for many years and will withstand rough handling. The drawers are lined with galvanized sheet steel and only strong oak is used in its manufacture. The drawer size is 2½ inches by 12 by 18 inches, and each drawer is provided with two pull handles and a card holder.

Manufactured by Stevens & Co., 375 Broadway, New York City, N. Y. Price, \$5.00.

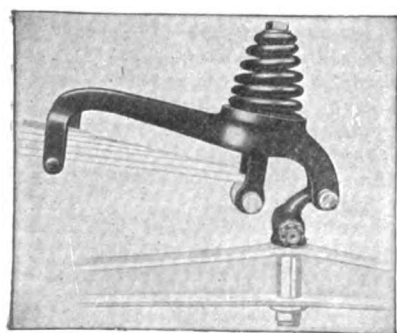
BURGESS SHOCK ABSORBER.

The makers claim this device does actually what has been claimed for shock absorbers for years—that it controls the car springs and prevents rebound, also absorbing the smaller shocks.

On the upthrow the weight of the car above the chassis is transferred from the tips of the springs to points near the centers where the recoil is greatest. It is impossible to control rebound from the tips of the springs. The conical springs absorb vibration before it reaches the main springs of the car.

The makers claim a guarantee on material and workmanship.

The Zinke Co., 1323 Michigan Ave., Chicago, Ill. Price, \$15 a set of four.



Burgess Shock Absorber.

THE "HANDY" TERMINAL.

A terminal which is claimed to eliminate all terminal troubles has recently been placed on the market by the Francis-Rand Co. of Cleveland, O. The jaws of this device are threaded on the inside and engage the threads of the spark plug centre bolt. One motion raises the ring, compresses the steel spring, releases the terminal and lifts it from the spark plug. There are no nuts to tighten or loosen or fish out of the drip pan. No tools are required and it can be attached or detached from the spark plug in one second's time. Most ignition troubles are traced to loose connections caused by vibrations and jar. The "Handy" cannot work loose for the greater the vibration the tighter the jaws of the grip and the better the electrical contact.

It is made in three sizes to fit any make of spark plug. Owners of all kinds of motor driven vehicles will welcome this trouble proof terminal.

Marketed by Francis Rand Co., Cleveland, O. Write for literature and prices.



The Handy Terminal.

BASE FOR AUTO JACKS.

In an emergency it sometimes happens that auto jacks have to be used on very soft ground and if such be the case it is not always possible to find a suitable foundation upon which to rest the jack.

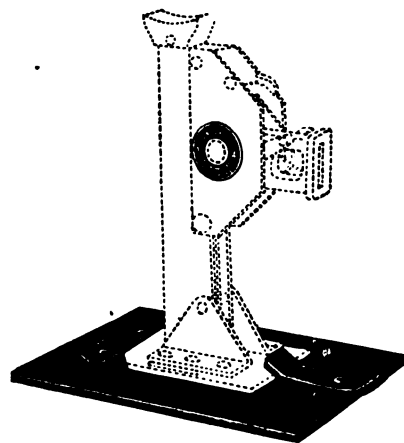
In such cases an exceptionally large base is required, whereas in the majority of cases an extra sized base jack is not only an annoyance, but an additional weight to handle and is always cumbersome to carry.

The Lane Supplemental Base meets these occasional requirements for larger base area without any disadvantages for regular usage. Being flat it is easily carried in the bottom or against the side of any tool compartment and does not occupy additional room, being left alone until it is needed.

In attaching for use the jack is simply placed in position on the base and clamped by turning a button.

This base is made in one size only for Lane Jacks, but it is understood that it may be used with any of the various sizes manufactured by this company.

Marketed by the Lane Brothers Co., Poughkeepsie, N. Y. Write for prices and literature.

Lane Supplemental Base.
TAR VERSUS TAR.

It is very seldom that a product is used to counteract the action of another product of the same class. In most cases a material having opposite characteristics is used to neutralize the effect of another substance. For example; an acid is used to counteract the action of an alkali. Another alkali product would have no effect as a neutralizing agent, but the acid possesses the required properties to perform the work.

One of the few times when the "like and unlike" theory is not used is in the case of Pontoklene (a Dupont product), a high grade remover of road tar. This product is itself a tar distillate and is very effective in removing another tar distillate, road tar, from automobiles. The application of the Pontoklene makes a reaction which completely dissolves the hardened tar on the machine and it may then be easily wiped off.

It is put up in quart and half gallon cans and can be purchased at most all garages and auto stations.

PERMATEX GASKET CEMENT.

Permatex Heat Resisting Gasket Cement is an extra heavy preparation compounded for use on cylinder heads, carburetors, manifolds, crank cases, gear cases, spark plugs and pump gaskets. It has no harmful action on cardboard, paper, leather, rubber or asbestos, and is impervious to gasoline, oil, water and heat. It is applied in a thin coat to both sides of a gasket just before the gasket is put into place. The makers claim this mixture possesses a heat resistance of five times that of shellac.

Prepared by Constant A. Benoit, Brooklyn, N. Y. Write for prices.



Permatex Products.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Prevention of Accidents A Leading Topic

Dealer Recommends That Brake Dangers Can Be Eliminated By
City Ordinances Requiring Regular Inspections of Equipment

A PERSON need only scan his morning paper to become impressed with the need of exercising every precaution while operating his motor car now that the season is in full swing. Accidents continue in increasing numbers and the majority are seemingly inevitable, as it is difficult to determine this exact cause. For this reason it behooves every motorist to see that the equipment on his car is in excellent shape and also that it includes every device that will promote safety of operation.

As previously advocated in this department, the adoption of an automatic combination rear signaling device which is controlled electrically from the driver's position and which indicates both in the day time and night, what direction the car is to take, will eliminate a large percentage of the accidents which now result from rear end collisions due to the fact that the operator in the rear has no warning of a sudden stop or turn to be made by the driver of the car in front. These devices are not expensive and are easy to install. Considering the security they afford an owner, their adoption it would seem, should not be delayed on the grounds of expense.

Brake inspection as a means of security against accidents has also been advocated and since the subject was first brought up there has been considerable agitation in its favor.

Mayor Hylan of New York City in his recent comment on the conditions of brakes on motor cars in their relation

to the number of accidents in New York City stirred up considerable discussion in motor circles there and the trend of opinion as brought out by the controversy indicates that the enactment of city ordinances or state laws requiring periodical brake inspection would not be looked upon as unduly restrictive, but a means of lessening greatly the factor of danger now attending the operation of a motor car.

One dealer in commenting on the mayor's remarks is of the belief that the solution of the brake question lies in brake inspection.

"I see that Mayor Hylan is much exercised over street accidents in New York and criticises automobile owners for having faulty brakes," says J. B. Hulett, president of the Brady-Murray Motors Corporation, distributors of Chandler cars. "I am glad he does not attribute all accidents to reckless driving. The brake matter is something that can be regulated by a city ordinance requiring regular brake inspections.

"Of course no owner wants brakes that will not operate efficiently when they are needed. He probably would subscribe very willingly to an ordinance requiring regular brake examinations. It would be to his own personal advantage, as well as to the public's interests.

"While he is on the subject of the regulation of the movement of vehicles in our streets, the mayor should seek to obtain more equitable speed laws. A blanket speed limit set for driving everywhere in the city does not work out sat-

isfactorily because the methods of timing the speed of a car are not accurate, and because 18 miles an hour is excessive speed for some thoroughfares and only a snail's pace for other sections, where 20 to 25 miles an hour is now the regular practise despite the law. For instance, now and then a motorist is 'picked up' by some ambitious motorcycle policeman for driving more than 18 miles an hour on Riverside Drive, when a rate of speed considerable higher than that is the general rule.

"It seems to me that the law as it stands now is very unfair to a man who happens to irritate some policeman. The latter pounces upon him and gives him a summons for doing something everybody's doing. One is too much a victim of the policeman's whim.

"Now there is no doubt about what constitutes reckless driving. Why not make reckless driving a cause for severe punishment? The average motorist would be very anxious to report the reckless driver and would seek to help the police department in every way to have him driven from the city streets and kept off. By going after the reckless driver pure and simple the city administration would be getting directly at the dangerous element and would eliminate a lot of petty prosecution. The latter only irritates the motorist who is trying to do what is right, but is often caught on a technicality when he was not in any way endangering pedestrians or other vehicles in the streets."

Another Grade Crossing Warning for Motorists

Over 109 Drivers Crash Through Signal Gates

In our last issue we presented the circular sent out to the motorists by the Public Utilities Commission of Connecticut, warning against the great danger at railroad crossings and the need of extreme carefulness at all times in observing the warnings placed at these points on the highways where the tracks cross the roads.

That the agitation against the reckless driver in this respect is not overdrawn is again proven by the records kept by the Long Island Railroad, which show that last year no less than 109 crossing gates on the company's lines, and that 16 of the machines that figured in these accidents had been hit and besides those who were killed, 18 were seriously wounded.

As a warning to motorists Ralph Peters, president of the Long Island Railroad, deemed it advisable to send out a public circular stating the facts that have urged him to recommend that the license of every motorist who disregards the signs at railroad crossings be revoked. The circular he has had issued and widely circulated is as follows:

"Notwithstanding all the precautions we have taken to protect automobilists against accident at grade crossings—and I can conscientiously say the Long Island railroad has probably done as much in this direction as any other railroad in the country—it is, indeed, appalling to say the least, to discover that there still lurks on the highways of Long Island a certain class of drivers to whom warning signs, danger signals and lowered crossing gates have no meaning whatever. These persons may be classified as thoughtless, reckless and inexperienced drivers.

"Although every grade crossing along our lines is protected either by sign post, automatic bell, watchman or crossing gate, yet hardly a day passes during which some careless, speed-mad or irresponsible automobile driver doesn't jeopardize his own life, those riding with him, and at the same time endangering the lives of thousands of troops on trains, the regular traveling public and train men. Surely, with hundreds of trains to run daily, we could not be expected to halt trains so that automobiles might pass safely over grade crossings. Yet there are scores of drivers who would either have us make stops at crossings, or else stop running trains altogether. At least their continued apparent disregard of the common sense rules for safety creates that impression.

"According to our records, no less than 109 gates, which had been lowered be-



Graphic Illustration Used on Long Island Railroad Circular to Impress Drivers with the Risk They Run in Crashing Through Crossing Gates.

cause of approaching trains, were broken off last year by automobile drivers on Long Island. Fortunately, only seven lives were lost as the result of collisions between automobiles and trains on grade crossings. To be sure that was seven too many fatalities, but just think how many more precious lives and limbs might have been sacrificed if the automobiles which broke through 109 crossing gates had all been struck by passing trains. As it was 16 of these recklessly driven automobiles did get hit, and besides those who were killed, 18 persons were more or less seriously injured.

Revoke Licenses

"Now there was no need for the occurrence of any one of these accidents. It was a criminal offense that every one of those 109 auto drivers committed, in deliberately disobeying the mandate to stop, look and listen at railroad crossings. There is but one means of discouraging and eliminating such dangerous practises, and that is to revoke the license of every driver who is found guilty of running his machine through a lowered railroad crossing gate. Frequently we have found the same automobile driver breaking off crossing gates at different places. His first offense should be his last.

"RALPH PETERS,
"President Long Island Railroad."

In addition to the circular to the public, President Peters also deemed it advisable to issue one to the employees of the road urging caution and cooperation in the campaign to eliminate the grade crossing accidents. This circular reads as follows:

To employees:—

You are all familiar with the successful efforts that have been made by this company in the past few years toward the elimination of grade crossing accidents, which has been largely due to the

vigilance and cooperation of our employees.

Each year sees an increase in the number of automobiles in use, with a corresponding increase in grade crossing accidents. To effect a reduction in the number of such accidents, further earnest effort and hearty support is necessary from our enginemen, motor-men and firemen, who are urged to be always on the lookout for—

Reckless drivers who try to beat the train over the crossing;
Nervous drivers who stall their cars on the track;
Careless drivers talking to their companions or who allow their attention to be otherwise diverted.

Watch for them at the crossing where travel is infrequent as well as at the busiest street. Many of them are at play—you are at work. No part of your work is more important than the avoidance of accidents. Sound your whistle again and again if the occasion requires it. Be quick with the brake if you think you are going to strike.

Crossing watchmen play an important part in the operation of the road and this company is proud of the record of such employees. We urge that your vigilance be not relaxed. Have your gates down and be out with your sign in ample time to stop vehicles or pedestrians trying to cross the tracks in the face of an approaching train. Not only know your time table, but be on the alert for the extra train that may appear at any time.

Be On The Alert

Instructions previously issued to report the license numbers of automobilists who take chances at grade crossings are repeated. In addition, we ask that reports be made promptly to the proper official of any failure of man, or appliance, to perform their full function in the warning of the public, and the protection of the traveler.

New Traffic Rules and Regulations in Force

Lincoln Highway in New Jersey Congested

All operatives of vehicles using the Lincoln Highway between Jersey City and Newark, will have to observe strict traffic rules. The new rules have been jointly adopted by the Boards of Freeholders of Essex and Hudson counties, and assented to by State Motor Vehicle Commissioner Dill. The congested conditions which have arisen on the highway between the two largest cities of New Jersey since the establishment of the great ship yards and other industrial plants on the meadows in its vicinity make the rules needful.

Under the new regulations all traffic is required to keep to the right, traveling on the granite block when going to Jersey City and on the wood block pavement when going toward Newark. All horse drawn or slow moving motor vehicles must keep to the extreme right to allow faster moving ones to pass them to the left when going in the same direction.

Drivers must exercise extreme care on the two bridges, over the Hackensack river and over the Passaic river. On each of these there will be a white line painted down its middle. All drivers must keep to the right of this line, and if a vehicle wishes to pass another on the bridge it must not do so if there is not space enough to the leading one's left so that the following one may pass without the left hand wheels touching the white line.

At the Jersey City end of the highway eastbound vehicles may not turn across the highway to enter West Side Park, but must continue straight ahead along Commumpaw avenue to where that avenue enters the park, so as not break the westbound line of travel.

EXAMINATION OF DRIVERS.

Pleas for a comprehensive law in the State of New York dealing with the compulsory examination of all persons desirous of operating motor vehicles is advocated by William L. Dill, motor vehicle commissioner of the State of New Jersey, in his report for 1917 to the New Jersey State Legislature.

"The example which Commissioner Dill quotes in his report," said Magistrate House of New York on receipt of copy of the report, "is one of the best arguments why every driver of a motor vehicle should be examined as to his or her physical ability, as well as his or her competency to operate a motor vehicle. Such a law would take the undesirable element off the streets and highways. If the man at the wheel is not fit to oper-

ate that car, either from the point of view of care or technical skill, it does not make any difference how good the car is or what the rate of speed, we have to come back to him, the man at the wheel."

"The wisdom of requiring every motor vehicle operator to submit to a rigid examination," says Commissioner Dill's report, "is becoming more recognized daily. Within the year the states of Connecticut and Maryland have enacted an examination law fashioned after the New Jersey code, and at a meeting of commissioners of motor vehicles of the states contiguous to New York, it was resolved to join with the National Highways Protective Society of New York in its efforts to have a law whereby every automobile driver in that state, whether he be a car owner or not, submit to an examination before license to drive is issued."

Amesbury Traffic Rules For the Season

Chief William S. Rogers of the Amesbury police department announced the traffic regulations for the coming season. He will place in position signs for the direction of traffic. Parking will be allowed on the road in front of Merchants' Row, and on the north side of Market square near the Powow River National Bank. No parking will be allowed on the south side and signs will be placed there to that effect.

The department is arranging for a vigorous enforcement of the automobile laws. Particular attention will be paid to the lights.

POCKET BOOK FOUND.

A pocket book containing cards, tickets and a small sum of money was found some time ago in the Back Bay district of Boston and is now at the office of Mr. N. P. Hallowell, 44 State street, Boston, Mass. This pocket book was found on the street and evidently a person in the machine ahead of Mr. Hallowell's dropped it and went off quickly so that he did not have an opportunity to give it to the owner.

TRAPS IN RHODE ISLAND.

In passing through Rhode Island the main route to the shore resorts and New York lies through North Main street in Pawtucket and Providence and Elmwood avenue in the latter city. Traps are being maintained on these two streets every day.

Officials Vigilant In Connecticut Sundays

With the opening of the motoring season in Connecticut the officials of that state in charge of enforcing the laws are leaving no stones unturned in their campaign to convince the reckless and irresponsible driver that his career will be short lived on the roads of the Nutmeg state, whether he is a native or from another state.

It is the belief of the officials that an early check to wild driving will prove very beneficial in lessening the number of accidents during the coming summer, as when it becomes generally known that infractions of the law will not be countenanced, the operators of cars will keep in mind the fact that careful compliance with the motoring regulations will keep them out of trouble even if they are not conscious of the fact that it lessens the dangers to their own lives, as well as those of everyone else who uses the highways.

Connecticut will be covered Sundays by vigilant inspectors from the automobile department and state policemen to detect violators of the automobile law. Commissioner Stoeckel has assigned his entire staff of inspectors to co-operate with the state policemen in patrolling the highways of Connecticut to prevent the violation of the law.

About one-third of the combined force will be mounted on motor vehicles and the remainder will be in automobiles. There will be a sharp lookout for every infraction of the law. Special attention will be paid to the speed of automobiles to see if the limit is exceeded. The automobile department is confident that this method of enforcing the law will be justified by the result.

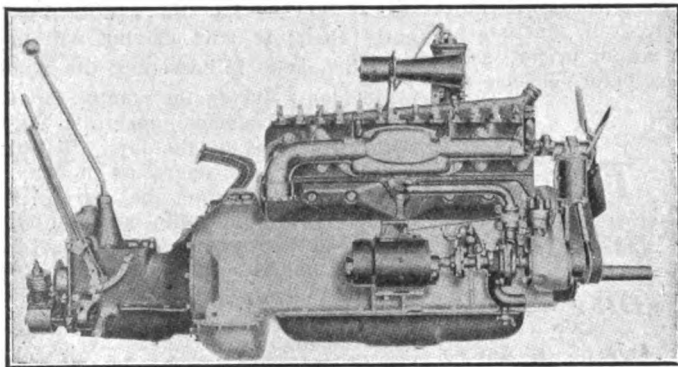
GREENWICH-OYSTER BAY.

The ferry between Greenwich, Conn., and Oyster Bay, L. I., has resumed operations on regular schedule for the season, opening the way for motorists to reach Long Island without making the long trip around through New York. This short cut for motorists saves over 60 miles of travel. The boat has been thoroughly renovated, as have also the pier terminals. Owing to the fact that automobilists of Westchester county, N. Y., and points in Connecticut use this ferry frequently to reach the army camps at Mineola and Camp Upton, the ferry owners are erecting road signs directing patrons over the best routes to reach those two cantonments. The boat has a capacity of 24 cars.

The Paige Car Model 6-55

The 20th series of articles dealing with the overhaul of used cars. It is the purpose of these discussions to show that a used car has extensive service value, which can be greatly increased with but a slight outlay and the replacement of worn parts. The 21st article of this series will appear in the May 10th issue of the Automobile Journal.

THIS article deals with the Paige six-cylinder, model 6-55, giving instructions for overhauling that type. These instructions are also applicable in general repair work on all models of the Paige of the past several years, which are similar in general mechanical detail.



Right Side of Paige Engine.

REMOVING AND CLEANING THE RADIATOR.

It is essential to wash the car thoroughly before starting to pull it down, as this does away with much of the danger from dirt and grit that might work into some part of the machine. Remove the various accessories on the body of the car, the floorboards, hood, etc., after which the radiator may be disconnected.

If the hose connections are not in excellent condition, it is not wise to save them. Lift off the radiator and lay it upon a bench and examine carefully for leaks or thin spots in the tubing, which if found should be soldered or otherwise made right.

Mix a solution of boiling hot water and washing soda and fill the radiator which is laying flat upon the bench. Shake the radiator to allow this mixture to circulate thoroughly. Do this a few minutes, after which it may be poured off. Then run clear boiling water through it, the idea being to clean the cooling spaces as thoroughly as possible. Cold water is finally used, which will leave the radiator free of dirt and sediment. When reassembling this process can be repeated with the engine running, which will clean the entire system.

DISASSEMBLING AND REASSEMBLING.

The various accessories upon the engine may now be dismounted and laid away in a safe place until their adjustment is to be considered.

The oil is drained from the crank case and the crank case removed and cleaned with kerosene and a stiff brush. In replacing the crank case shellac the gasket either on the crank case side or the cylinder block side, but not to both. Fill the oil troughs, as this will insure the cranks getting oil upon their first turn. Do not fully tighten any one bolt until they are all drawn tight. All parts should be carefully lubricated. All nuts and bolts are to be thoroughly and evenly tightened. All cotter keys and pins are properly bent to insure against accidental loss.

GRINDING AND READJUSTING THE VALVES.

The valves are enclosed and become accessible by removing the screws on the cover plate, two plates with two

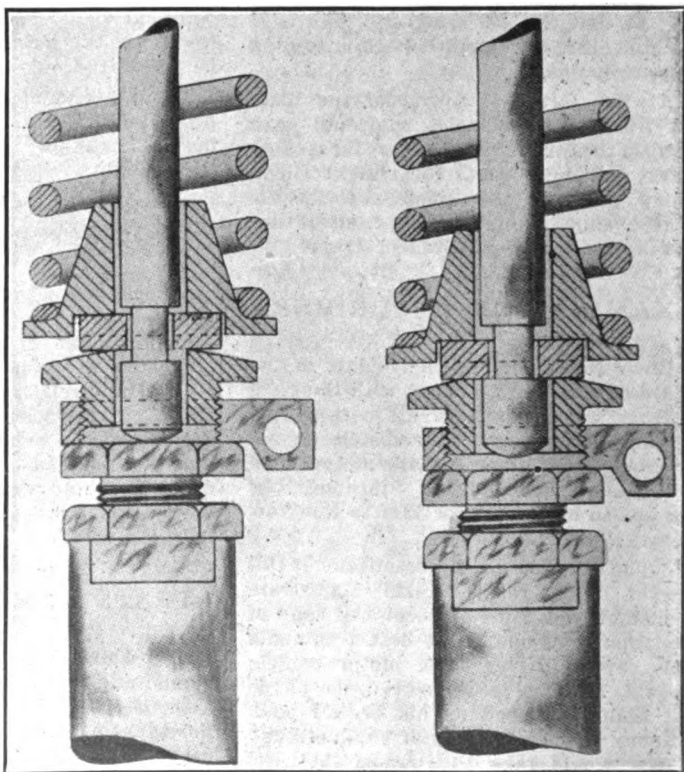
Overhauling The Automobile

screws each. Removal of these plates will expose the valves, valve springs, retainers and adjusting screws. Adjustment on this type of valve tappets is known as the "screw adjustment."

Remove the plugs in the cylinder head, the valve chamber and on the valves and pistons. This will allow the valve spring retainers to be removed by releasing the tension on the springs, after which the valves can be lifted out.

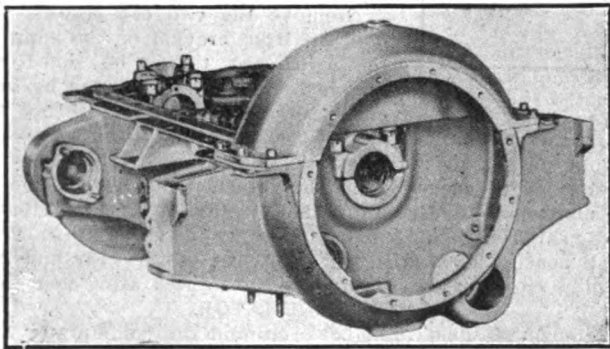
The valve grinding is a common operation and each individual has his own methods for doing this, but the best way to check up the perfect seat after grinding is to take a pencil, make two straight lines one-half inch apart all the way around the valves to keep clean and doing away with readjustment slight pressure one-quarter of the way around the seat and take out. If the valve has wiped out all the pencil marks it has a perfect seat, otherwise, the low spots will show and re-grinding is necessary. Be sure that all the grinding compound is removed and each separate part washed carefully in gasoline to remove any emery that might adhere to the various parts by this operation.

On the late models the automatic valve rotator is standard equipment and this device is very valuable in assisting the valves to keep clean and doing away with readjustment or grinding. It can be purchased from any Paige dealer and is installed as follows: Assemble the valve, valve spring retainer and spring retaining washer. Hold the spring retainer between the thumb and finger of one hand, then spin



Cutaway View of the Automatic Valve Rotator.

the valve with the other. If the valve spins freely it is ready to assemble to the engine in the regular way. If the valve does not spin freely find where the binding action occurs. This may be a burr or a sharp edge on the retaining washer, or perhaps a tight fit in the valve stem groove. Overcome this by taking an oil stone and relieving the sharp edges or high spot so that the valve will turn easily. Put this assembly back into the engine in the regular way and adjust the tappets so that there is from .003 inch to .005 inch clearance between the end of the valve stem and the top of the adjusting screw. After this is done raise the valve and place the automatic valve rotator in place. In adjusting this device the engine is turned over until the valve is seated, holding the locking nut with one hand and adjusting the thumb screw with the other. It should be so adjusted that there is no end play between the retaining washer and the tappet adjusting screw. Should the valve not be able to be reached with the fingers conveniently, the adjustment can be made by holding the locking clamp with a file that has the end turned up to right angles. Perfect results can be obtained from these methods.



Bell Housing and Crank Case.

PISTONS.

The correct amount of clearance between the piston and cylinder is .001 inch to each inch of the bore, using .002 inch over this measurement as a high limit. A piston with this clearance should not slap or pass oil.

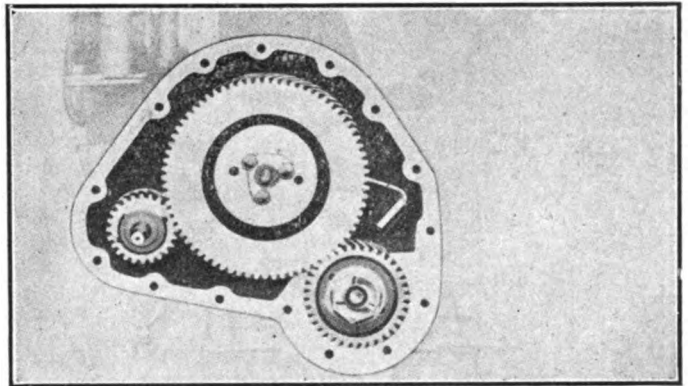
In a great many instances pistons have been taken out for passing oil or for slaps when the condition of the piston shows no apparent reason for removal, the piston showing perfect bearing surfaces well polished. It is, therefore, necessary to change only the one causing the slap and not all of them.

In fitting the rings when new ones are replaced care should be taken that they fit snugly in the grooves, but do not bind or stick. When using a grinding compound upon the pistons, in case lapping is necessary, great care should be exercised that every minute particle is removed.

Wristpin knocks should be considered as to whether the bushing or pin is causing the knock before it is changed.

MAIN AND CONNECTING ROD BEARINGS.

In the event that the main bearing has been pounded or burned out, there will have to be scraped about .010 inch from the top of the bearing, and this should be dropped down, the thickness of shim placed behind it amounting to the amount scraped off. If this was not done the crankshaft would not line up properly with the main drive gear in the transmission. All nuts and bolts should be carefully replaced and tightened uniformly, after which the keys can be inserted to hold them from accidental loosening. After inspection of the connecting rods it will be noted upon removal of the cap that laminated shims separate the cap from the rod. These shims consist of a number of thin stampings about .002 inch thick and are so designed that two, three or any number may be removed, according to the take up necessary. They also may need scraping and much care should be taken with this process. Care should be taken that the fillets of the bearings should be well cut away, as if this is not done a proper bearing cannot be obtained in the centre. After the rod bearings are scraped the connecting rod should be lined up, because if the connecting rod is but slightly sprung, it

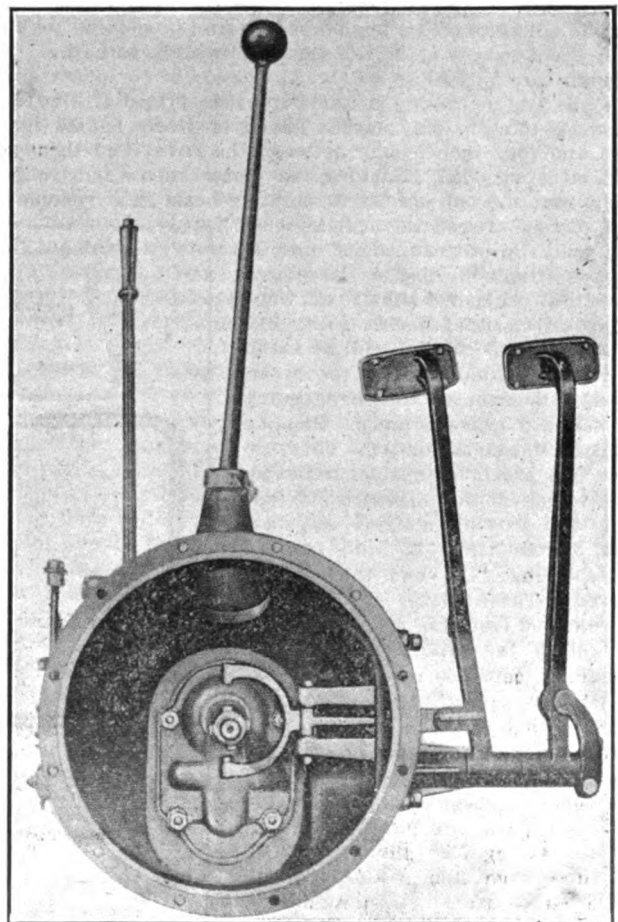


Cover Removed Showing Timing Gears.

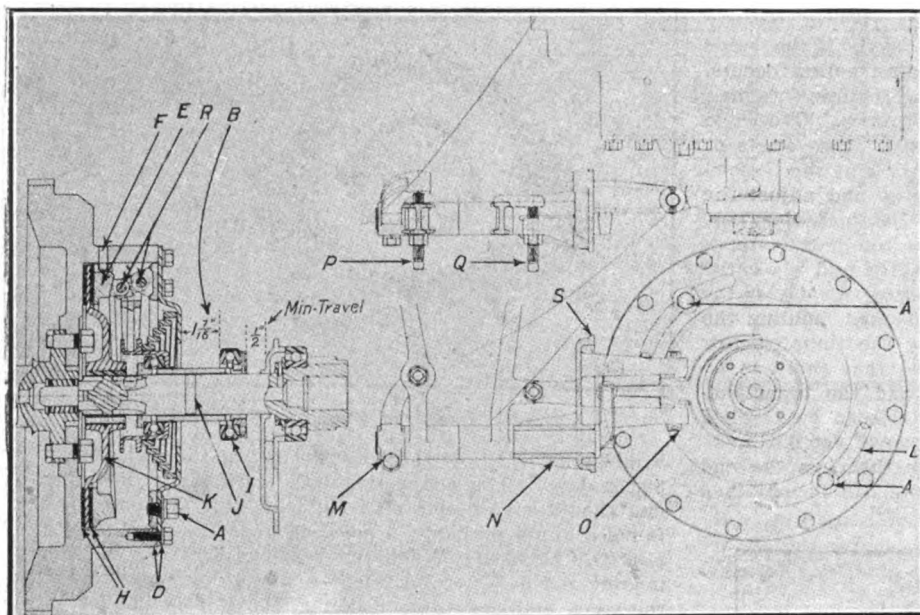
would tend to throw the wristpin end of the rod against the piston boss. The connecting rod bearing on the crank pin end should have a side play not less than .002 inch. If there is not a lining jig handy a piece of stock the size of the crank pins can be used. When the bearings are scraped the connecting rod is set up on this, a combination square rested on the stock and the rule set against the side of the piston and the rod sprung until the rule touches the entire length of the piston skirt. This will do a fairly good job of lining and while it is not exactly accurate, it is better than not lining them up at all.

INSPECTION OF THE TIMING GEARS.

In order to remove the timing gears the engine must first be unbolted from the chassis and then jacked up far enough so that the gear housing clears the cross member of the chassis. Remove the fan pulley and then the gear housing cover can be taken off. Turn the engine over until the marked teeth on the crank and cam gears come directly in line, and when these are in line proper the removal of four screws and the dowel pin will release the cam gear so that it will easily slide out of position.



Control Levers and Pedals in Bell Housing.



Sectional View of Clutch and Operating Mechanism.

The crank gear is held in place by a Woodruff key and the starting crank nut. The pump gear is held with a Woodruff key. The removal of these keys will allow the taking off of the gears. When reassembling be careful to get the punch marks on the crank and cam gears directly in line. This will insure proper timing, provided the crankshaft position has not been changed.

Examine all the gear teeth for wear. A worn timing gear is productive of much noise, as well as causing the time or opening of the valves to vary. It is obvious that the gears should be well fastened to the shaft to avoid noise or irregular operation.

THE CLUTCH.

The clutch is of the dry plate type and is encased together with the flywheel by a bell housing in unit with the transmission case.

It is first necessary to uncouple the propeller shaft; release the clutch and place a block of wood 1 15/16 inches high and four inches long between the cover and throw out yoke at point "B." Remove the clutch throw out yoke by taking out the cap screws at point "S" and next remove the cap screws around the bell housing and pull the transmission directly back. This will expose the clutch assembly. Place a block of wood opposite the other one at point "B."

At point "D" an "X" will be found to denote the old holes on the cover. This is to insure the cover going back into the proper place. Remove the cap screws around the cover so that this assembly can be removed. After removal this leaves the thrust ring and driving member exposed. The thrust ring "E" and one asbestos ring "H" can then be removed. Three drive pins "F" can be removed from the flywheel, which will allow the driving member and remaining asbestos ring to pull free.

If the asbestos rings are oil soaked wash them in gasoline and allow to dry before replacement. Set the driving member (K) and then the second asbestos ring. Tap the drive pin back into place. See that the thrust ring "E" slides freely on the three drive pins in the flywheel. If the edges are burred they should be dressed. This is very important. Inspect point "R" on the clutch

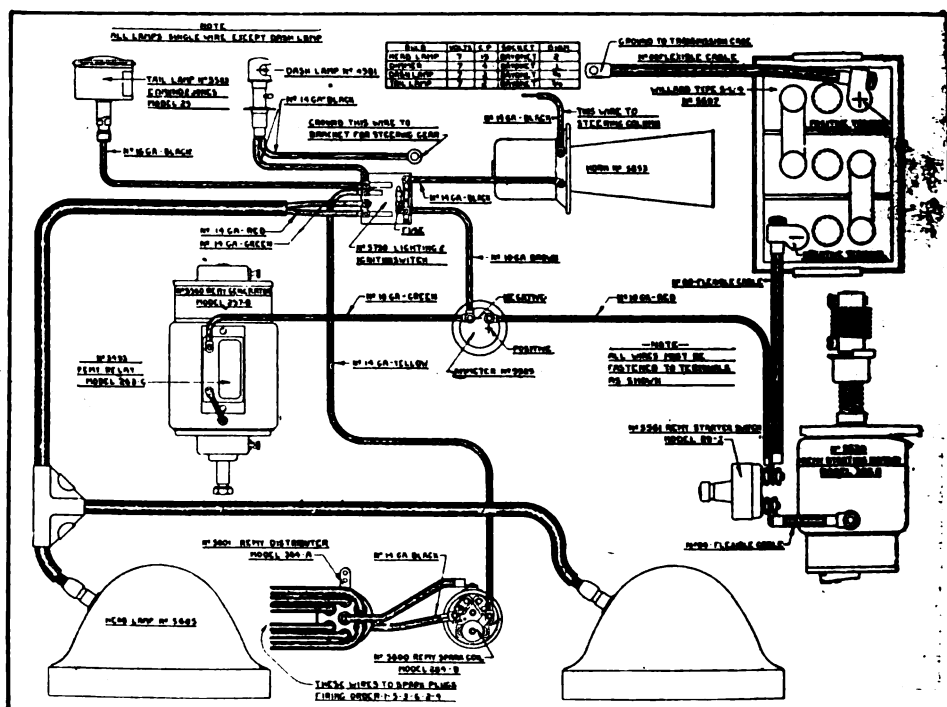
cover to see that pins are free. Then start the clutch cover cap screws, of course getting the holes lined up properly. Then insert main drive gear "J" in place. The main drive gear may be kept for this purpose so as to save time in dismantling from transmission, as this is used for line up of the clutch only.

If after the clutch cover is tight it is sometimes necessary to loosen the adjusting screws "A" to allow the clutch mechanism to shift to the proper line of holes. After the clutch cover is in place, tighten all cap screws, tap main drive gear from side so that it will slide free and properly line up. Remove the wood blocks and take out main drive gear and the transmission can then be set in place, clutch throw out yoke replaced and adjustments made.

Remove the two cap screws that hold the front bracket on the pump to the gear case, taking off the Remy distributor shaft and housing by loosening locating screw and lifting the distributor assembly from the gear housing, after which the complete assembly and gears can be removed from the gear housing. This assembly can be returned in any position as the distributor is timed by the location of the distributor drive gears. All end thrust is taken up in the pump shaft by a ball bearing located in the front end of the gear housing. Examine carefully for worn parts and tighten after cleansing.

REMY GENERATOR.

Remove the dust tight cover around the commutator end of the generator and note the condition of the brushes. The commutator wears naturally to a brownish color in normal use, but if it should appear black or scored, the surface must be smoothed with a piece of fine No. 00 sandpaper. Never use emery cloth, as the particles from this material would cause serious damage should they lodge in the pores or segments of the copper. Blow out all the remaining dust and note that the brushes swing freely on their pivots and that the spring tension is sufficient to give them good contact with the commutator. Should the brushes need replacing they may be obtained from the Remy factory, but never use cheap, inferior types of brushes, as this will later develop



Wiring Diagram—Paige Model 6-55

more trouble to this assembly.

In cleaning the thermostat care should be taken not to spring the thermostat blade in any way, as its accuracy will be destroyed should the contacts be pried apart.

REPLACING DYNAMO BEARINGS.

The bearings of the dynamo must be lubricated regularly to give satisfactory service. The dynamo runs at a high rate of speed and in case these bearings are not regularly lubricated it will become necessary to replace them. This should be handled by a garage repairman, but should the owner wish to do his own work he can proceed as follows:

After the generator is removed from the engine remove the two covers from the commutator end of the generator. Remove the three screws from the bearing cage cover. Remove the cover and thrust spring. Remove the four screws from plate on drive end of generator. Gently draw the armature from the dynamo, being sure to hold the brushes so that they will not snap down and break. Place the armature in a vise and remove the coupling and end plate. Then remove the inner bearing races from the armature shaft and the outer bearing races from the frame of the dynamo and from the end plate. Press the new inner races on the armature shaft, care being taken that the pressed steel oil retainers, which have felt washers attached, are in position on the armature shaft. The felt washers should be shellacked and placed on the retainers and the retainers located concentric with the armature shaft before the inner ball races are pressed down to hold them in position. Insert the armature in the dynamo frame with the ball retainers and balls on the shaft, care being taken that the brushes are not damaged. The armature should be entered part way and the brushes lifted. The armature may then be pushed into position and the brushes lowered into contact with the commutator. Tighten the four screws in the drive end plate and tap the outer bearing race on the commutator until all end play is taken up, after which the cover can be replaced.

STEWART VACUUM GASOLINE TANK.

It is well to examine this assembly for although while it is seldom out of order there is always the chance of dirt or sediment lodging in the various openings.

When removing the top of the tank, after taking out the screws, run the blade of a knife carefully around the top between the cover and body of the tank so as to separate the

gasket without injuring it. This gasket is shellacked to make an air tight joint.

The float, which should be air tight, may have developed a leak which will allow the float to fill with gasoline, thus making it too heavy to rise enough to close the vacuum valve. This allows gasoline to be drawn into the manifold, which in turn will choke the engine. Dip the float into a pan of hot water to find out if there is a leak. Bubbles will be seen at this spot and it should be marked with a pencil. Punch two holes, one at the top and the other at the bottom of the float to permit the running off of the gasoline therein. Then solder up these holes and the leak. Again test the float in hot water and if there are no air bubbles the float is air tight. Do not use more solder than is necessary, as this will make the float unnecessarily heavy. Take care not to bend or otherwise injure the float guide rod, as in this case it will strike against the guide and have the same effect as a leaky float. Note that the surface of the rod is perfectly smooth.

THE RAYFIELD CARBURETOR.

The Rayfield model "M" carburetor is used and should this assembly need repair parts they can be obtained by ordering from a branch or agency of the Findelsen & Kropf Manufacturing Co., who have stations in every city.

There are two adjustments only, one for high and intermediate speeds and one for low speed. When these adjustments are set they lock automatically and cannot change. When adjusting the carburetor be sure and have the dash control plunger down.

The low speed adjustment is turned to the right or left as required until the engine runs smoothly and evenly at low speed. If the engine does not throttle low enough turn the stop screw arm to the left until the engine will run at the lowest number of revolutions possible.

Remove the hot air elbow from over the main air valve, but do not move the high speed screw more than one-eighth of a turn at a time. Turn to the right for a richer mixture and to the left for a leaner mixture, this setting being best for economy. Make sure the mixture is as lean as possible and still obtain good acceleration.

STEERING GEAR.

The steering gear is of the semi-irreversible screw and nut type. Lost motion in the gear itself is removed by means of the large nut at the top of the gear housing.

The reach rod in connection with the steering gear is provided with a ball socket joint at each end. They contain springs which absorb the road shocks and take up the lost motion.

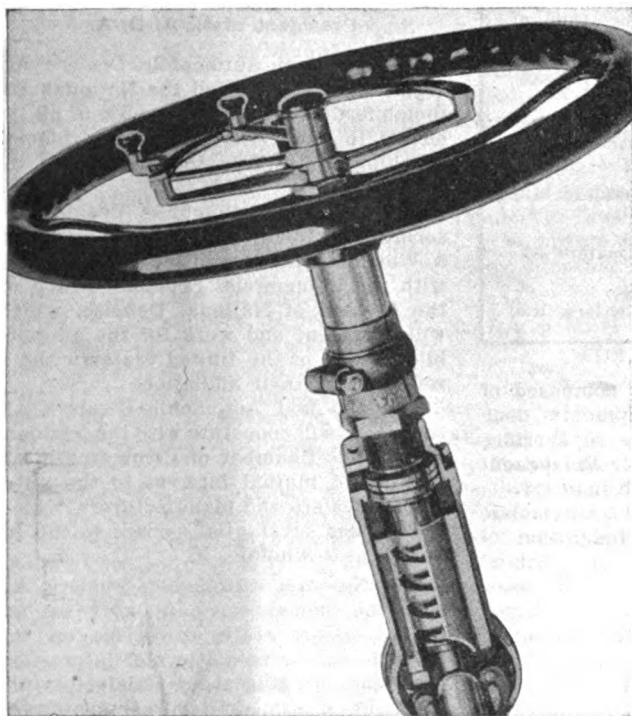
Remove the steering or pitman arm from the end of the yoke shaft. Next remove the cap from the bracket which attaches the steering post to the instrument board. Remove the bolts that hold the steering gear housing to the frame of the car. Remove the four cap screws which attach the cover to the steering gear housing. Loosen the clamp screw at the bottom of the steering gear housing and disconnect the spark and throttle levers where they are attached to the lower end of the spark and throttle control tubes. This will permit the upper part of the steering gear to be raised from the housing and removed from the car. The housing, which still contains the yoke shaft may be turned towards the front of the car, which will allow it to be removed.

When reassembling the steering gear, be careful to place the half nuts in the proper position. The left hand threaded half nut should be on the top. The pitman or steering arm must be reassembled in its original position on the yoke shaft to insure that the gear will have the same throw in either direction. It is also advisable before reassembling the gear to fill the housing with a good grade of graphite grease. The bushing in the housing that supports the yoke shaft is of the same lubricating type, and in case this becomes worn, or is damaged, a new bushing should be ordered from the factory, as an ordinary bronze bushing is not suitable for use at this point.

SPRINGS.

There are no adjustments provided on the spring bolts. However, there are removable bushings in the spring ends. The spring bolts are of hardened steel and the bushing of a soft alloy perforated to hold grease to insure proper lubrication.

(Continued on Page 48.)



Cut Away View of Steering Mechanism.

National Automobile Dealers Association

An Organization of Motor Car Dealers Throughout the United States Working For the Betterment of Trade Conditions and Protection of Agents' Interests

The National Automobile Dealers Association is an organization originally comprising a membership of local associations only, but now accepting individual memberships from any established dealer in automobiles.

Its original memberships consisted of automobile dealers' organizations from 16 states, comprising a group of the largest sellers of automobiles in the world, representing practically every automobile now manufactured.



F. W. A. Vesper of St. Louis, President of the N. A. D. A.

Included in the list of its first membership under its first charter were the organizations representing the largest automobile distributing centres in the United States, both in prominence and in volume of cars distributed, prominent among which are:

Chicago Auto Trade Association.
Philadelphia Auto Trade Association.
Boston Auto Dealers Association.
St. Louis Auto Manufacturers and Dealers Association.
Cleveland Auto Show Company.
Kansas City Motor Car Dealers Association.
Minneapolis Auto Trade Association.
Motor Car Dealers Association of Los Angeles.
Louisville Auto Dealers Association.
Atlanta Auto Dealers Association.
Milwaukee Automobile Dealers Association.
Rocky Mountain Auto Trades Association.
Des Moines Auto Trade Association.
Worcester Auto Dealers Association.
Albany Auto Dealers Association.
Oklahoma City Motor Car Dealers Association.
Dallas Auto Dealers Association.
Brown County Auto Trades Association.

It represents in its personnel the progressive, alert, active automobile dealer who is beyond mere selfish personal interest and who has the welfare of this entire industry at heart, and who believes in any constructive movement that will upbuild the same.

OFFICERS

President,
F. W. A. Vesper,
Director St. Louis Auto Manufacturers and Dealers Association.
First Vice President,
John H. MacAlman,
President Boston Automobile Dealers Association, Inc.
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C. A. Forster,
Cleveland Automobile Dealers Association.
Dean Schooler,
Des Moines Automobile Dealers Association.
Geo. W. Browne,
Milwaukee Automobile Dealers, Inc.

Its board of directors is composed of aggressively interested automobile dealers and distributors ready to sacrifice their time and influence for the benefit of the selling branch of the industry.

In short, the National Automobile Dealers Association is a federation of progressive automobile dealers, behind which stands the foremost dealers associations, and a majority of the largest organizations engaged in the selling of automobiles in the United States.

It has grown from a mere thought to a powerful reality since its organization, and merits your active interest and support.

The preliminary organization of the National Automobile Dealers Association took an active part in the campaign before the finance committee of the United States Senate, which resulted in the reduction of the war tax on automobiles from five per cent. to three per cent. Its work in behalf of the industry, as a whole, during this campaign has been warmly commended by the National Automobile Chamber of Commerce.



John H. MacAlman of Boston, First Vice President of N. A. D. A.

The National Automobile Dealers Association has supported the National Automobile Chamber of Commerce in all its efforts to modify the attitude of official Washington towards the automobile industry.

The National Automobile Dealers Association is furthering the movement for a War Service Committee to cooperate with the Commercial Economy Board of the Council of National Defense, which will represent and work for the automobile dealers of the United States without reference to their affiliation.

The National Automobile Dealers Association will cooperate with the National Automobile Chamber of Commerce in all matters of mutual interest to the automobile dealers and manufacturers, which will render substantial service to the industry as a whole.

The National Automobile Dealers Association officials have in two cases appeared before state executives on important legislative matters of interest to the trade, bringing about satisfactory adjustment of same, after representatives of local dealers had failed to get a hearing.

It has already called attention of proper boards to the injustice and detriment represented in the order against shipping of road materials, believing that permanent highways offer the greatest solution for the relief of the transportation problem, and that the building of highways should be speeded up instead of retarded.

It has been and will continue to be active in assisting in finding a solution to the shipping situation, which is probably the most serious thing now confronting the dealer in automobiles.

It has been and always will be found active in everything that is good for the industry, and against anything that may be detrimental.

The National Automobile Dealers Association proposes to have a representative to act for the automobile dealers of the United States at the National capitol and all state capitols in matters of legislation of interest to the automobile industry.

To protect and conserve the rights and interests of the automobile dealer wherever and whenever necessary.

To maintain a legislative committee with powers to act in support of beneficial legislation and authority to oppose detrimental legislation in Congress and the state legislatures.

To encourage and assist in the establishment and maintenance of improved highways, roads and street, and of just laws regulating the safe and proper use of the same.

To collect, classify and keep on hand for reference and for distribution among its members and others, information, data and statistics regarding approved methods of road building and road maintenance and of laws regulating the use of public roads and highways.

To afford opportunity to members of associating and interchanging views with each other, and of taking such concerted action as may be desirable looking towards the betterment of trade conditions generally in the automobile business.

The National Association proposes to bring about the coordination of all conflicting state laws pertaining to the automobile industry, and will establish at each state capital a representative who will keep the board of directors informed upon impending legislation of a drastic or prejudicial character.

It will urge those in control of the railroads of the country to provide the transportation facilities necessary for the proper delivery of automobiles to all sections of the country, thus insuring a dealer relief from a most serious handicap to the successful conduct of his business.

There are 48 state legislative bodies and one national legislative body making laws, and their combined output is not far from 15,000 statutes annually, a great many of which pertain to the automobile industry. Therefore, vigilance is necessary to prevent unfair or detrimental statutes from becoming laws.

It is almost impossible to correct unfavorable legislation once it becomes a law, and it is therefore necessary to fur-

nish proper information that will prevent the adoption of unfavorable legislation in order that the automobile business can preserve and maintain a position equal to other industrial bodies in the world of trade.

In short, the national association is an organization of automobile dealers who are banded together for the purpose of protection of their business and the upbuilding of an industry which has for its foundation the world's greatest asset—transportation.

The value of the National Automobile Dealers Association to its members and the trade in general was illustrated recently when the board of directors applied all its energy to remedy one of the most perplexing situations that has confronted the selling branch of the industry since the beginning of the war.

Pennsylvania state and local authorities entered into conflict with the ruling of the director general of railroads in connection with the order that automobiles be driven from factories to dealers' destinations. A fleet of 50 Oldsmobiles being driven from the factory at Lansing, Mich., to the Philadelphia and New York City distributors was held up at York, Pa., for two days while licenses were secured in compliance with the state law, and the Philadelphia and New York distributors were compelled to pay \$720 to cover the expenses of 50 drivers during the hold up and before being allowed to proceed to their destination.

As soon as the facts were presented to the secretary's office and A. E. Maltby, director of the National Automobile Dealers' Association, at Philadelphia, a vigorous protest was entered with Governor Martin G. Brumbaugh of the State of Pennsylvania, E. A. Hugentungler, mayor of York, Pa., where the hold up took place, and J. D. O'Neil, Pennsylvania state highway commissioner, and others.

An appeal for protection while carrying out the embargo orders issued from Washington was forwarded to director general of railroads, Wm. G. McAdoo, and chairman of the Council of National Defense, Bernard Baruch. The cooperation of Alfred Reeves, general manager of the National Automobile Chamber of Commerce, was also solicited and a general campaign to overcome the Pennsylvania situation was inaugurated.

GARAGE MEN OF CANTON, ILL., FORM NEW ASSOCIATION.

The Canton Garage Owners' Association has been organized in Canton, Ill., by the garage owners of that city and the following officers have been elected: President, A. R. Street; treasurer, Meade McClatchey; secretary, T. J. Jelly. The organization will be affiliated with the Illinois Garage Owners and Dealers Association. The president of the latter organization, who was present and aided in forming the local association, told of the many benefits to be derived through organization and the improvement in trade conditions that would result.

The War Service Committee of the N. A. D. A.

**Headquarters Established with National
Automobile Chamber of Commerce
in Washington.**

The Chamber of Commerce of the United States has indorsed the appointment of the following War Service Committee by the National Automobile Dealers' Association. This committee was appointed in pursuance to a request issued by the War Economy Board of the Council of National Defense and followed the meeting held in Washington between A. W. Shaw, chairman of the Economy Board, and a delegation of dealers from important distributing centres of the country.

Chairman, F. W. A. Vesper, St. Louis Auto Manufacturers and Dealers Association.

Earl C. Anthony, Motor Car Dealers Association of Los Angeles.

Chas. Collier, Brown County Auto Trades Association, Green Bay.

A. E. Mitzel, Ohio Auto Trades Association, Canton, O.

A. E. Maltby, Philadelphia Auto Trade Association.

F. E. Murphy, Minneapolis Auto Trade Association.

Geo. W. Browne, Milwaukee Auto Dealers, Inc.

Dayton Keith, Chicago Auto Trade Association.

J. H. MacAlman, Boston Auto Trade Association, Inc.

Geo. D. McCutcheon, Atlanta Automobile Association.

O. P. Tyler, Worcester Automobile Trade Association.

Fred J. Caley, Cleveland Auto Show Co.

Chas. M. Brown, New York Automobile Dealers Association.

F. L. MacFarland, Rocky Mountain Auto Trade Association.

Prince Wells, Louisville Auto Dealers Association.

Thomas J. Hay, Chicago Auto Trade Association.

Dean Schooler, Des Moines Auto Trade Association.

The president has appointed A. E. Maltby, president of the Philadelphia Automobile Trade Association, special Washington representative of the National Association, and has so notified H. F. Fowler, secretary of the War Service Executive Committee, Washington, D. C., and Alfred Reeves, manager of the National Automobile Chamber of Commerce.

Headquarters of the National Association in Washington, D. C., will be in the headquarters of the National Automobile Chamber of Commerce, 509 Seventh street, S. W. This arrangement will prevail until permanent headquarters are established there.

The AUTOMOBILE JOURNAL

Is the oldest Automobile magazine published in America devoted wholly to the owners of passenger cars.

A quality magazine with prestige and circulation that brings results to advertisers.

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PAWTUCKET, R. I.



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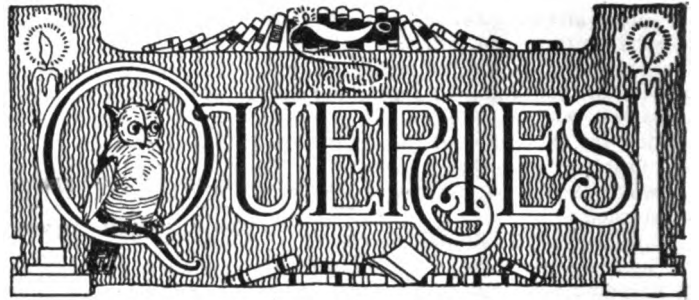


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The New Departure Manufacturing Co., Bristol, Conn.
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NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW DO YOU OBTAIN MAXIMUM MILEAGE FROM YOUR TIRES?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 5th of May. The contest is open to every one.

WHAT ARE THE MOST IMPORTANT POINTS IN THE MECHANISM OF THE CAR TO BE GIVEN ATTENTION IN TUNING UP FOR THE SPRING DRIVE.

(R. L. Prindle, No. Abington, Mass.)

Best Letter.

For cars that have been in storage or have seen considerable service during the winter, the time has arrived for the tuning up process. Before any work is started on the car it should be carefully and thoroughly washed, as cleanliness is closely allied to efficiency. This applies also to the engine, running gear, transmission and brakes, etc.

The top is next lowered and floor boards taken up so as to admit as much light as possible. It is best to start work at the engine, going step by step until the rear axle is reached.

There are five conditions necessary for the gasoline engine to run steadily and satisfactorily, which are: Compression, carburetion, ignition, lubrication and cooling. Since one of these is useless without the other it will be very necessary to bring all of these up to a high standard of efficiency in order to get lasting results.

Compression is tested by opening all petcocks but one and fitting the starting crank, testing each cylinder (first closing petcock) and comparing the resistance offered by each. If found to be weak, start the engine and running at normal speed, with an oil can filled with lubricating oil, place a few drops around the spark plugs, around the valve covers, valve bushings and also at the detachable head, where it is fitted to the block, noting if bubbles form, which will indicate leakage. If cylinder block is marked by black, brown or rusty streaks, it means leakage and may be remedied by renewing the gasket, well covered with shellac and tightening it before it becomes dry.

The carbon should be removed and valves ground to be assured that there is no leakage from that source.

Next comes the carburetor, which is thoroughly cleaned and no air leak allowed anywhere. Start the engine and with oil can filled with gasoline squirt a few drops between the carburetor and the manifold, also between the manifold and engine. If the engine action is changed leakage is evident, which should be remedied. In replacing gaskets on the intake system the old ones are removed and both the manifold and block are scraped clean with a sharp knife or chisel. New gaskets are then coated with shellac and well tightened before becoming dry.

Throttle and choke levers are worked to see if they operate correctly. The gasoline tank is next drained and the filter screen in the carburetor removed and cleaned. The fuel line is disconnected at both ends and with the aid of a tire pump a current of air is forced through it.

A great deal is required of the ignition system today. Start at the plugs and work back through all the units. Clean and adjust the plugs .015 inch to .020 inch, that giving best results. Examine for cracked insulation, both in the plugs and wiring, taping or removing the latter. Also clean and tighten terminals and supporting other wires lacking proper fastening.

When the ignition distributor is reached remove the cover. With a fine, flat file smooth the points, care being taken not to remove any more than is necessary. Adjust if required, using the gauge provided for this purpose.

Any of the carbon brushes appearing to stick in their holders may be loosened up with a drop of gasoline and weak spring pressure may be increased by pulling out with the fingers. No one should attempt to go further in making repairs upon the electrical apparatus.

The oil in the crank case should be drained and a gallon of kerosene poured through the breather pipe and the engine spun either by hand or the starting motor. Drain the kerosene off and refill this time with a somewhat heavier grade of oil. Lubrication is largely a matter of cleanliness in oil and oil screen.

Care given the cooling system is time well spent. If an anti-freeze compound is used during the winter the hose connections will probably need replacing, due to swelling and rotting.

The radiator is cleaned by dissolving one-half pound of washing soda in a large pail of hot water and allowing this solution to strain itself into the cooling system by pouring through cheese cloth into the radiator. Run the engine 10 minutes, switch off ignition and later again start it and run for the same period. After draining this solution allow pure water to run through by means of a hose turned into the filler cap until the system is flushed out thoroughly. This applies to the thermo-syphon system equally well, also the engine should be running while the flushing is going on.

Oil on the fan belt may be absorbed by liberal applications of French chalk at intervals.

The steering system and brakes are highly important and for this reason great care is used in their adjustment and inspection, and for play in the joints. Disconnect the drag link and tie rod from the rest. All joints should be cleaned with a stiff brush dipped in kerosene, then wiped with waste and repacked with grease. Next start on the knuckles, removing the large bolt, cleaning same and replacing and oiling.

Provision for taking up play in the steering wheel is found in the gears at the bottom of the steering post.

Tire life is largely a matter of true running of the wheels. Jack up each wheel and standing a few feet away in line give it a spin and note whether it wobbles. This should be corrected in every case.

The brake assembly is best adjusted by removing the gear wheels, making adjustments at several points.

In case the transmission and rear axle are drained a heavy lubricant should be put in.

Apply a wrench to all nuts throughout the car and see if they can be tightened a little more.

There remains the inspection and care of the starting and lighting system. In the generator the commutator should present a bright coppery appearance, and black accumulation due to carbon dust produced by wearing down of the brushes may be cleaned with light sandpaper.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

EASE THAT STRAIN



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COMFORT FOOT REST

Give your foot the same fair chance your hands have, of being comfortable: a Comfort Foot Rest does it!

Your hands don't get tired because you can *rest* them on the wheel; but there's a lot of leg and foot strain that you've *had* to take—heretofore. The rigid position on the accelerator gives no rest.

With the Comfort Foot Rest it's different. "The Comfort pays by the foot—every single yard you travel." Insures an even flow of gas; abolishes muscle weariness.

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Order through your dealer, or we will send you one of these foot rests upon receipt of \$2.00.

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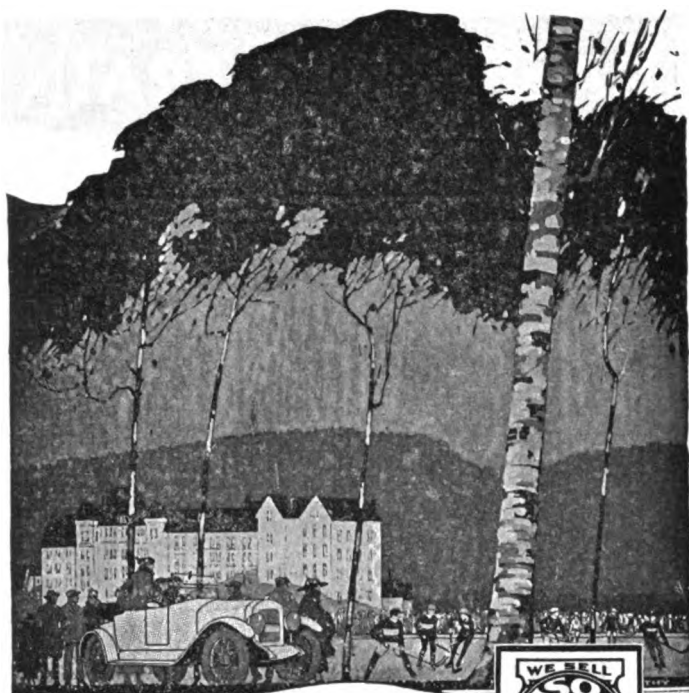
If you are aiming for New York why not strike the center? This is where the HERMITAGE is located.

In the middle of the Times Square district. The HERMITAGE touches elbows at once with the great amusement and business centers of the metropolis.

Room with adjoining bath \$1.50 up

Room with private bath \$2.00 up

FRANK C. HURLEY, Proprietor.



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POLARINE

The Standard Oil for All Motors

Polarine Oil gives mid-summer lubrication in mid-winter weather—maintains the same efficient film of oil between cylinder wall and piston. Heightens compression—lowers engine heat. Always high-grade—dependable.

And for quick starts, snappy pick-ups, no matter what the season, use SOCONY Gasoline. Pure, uniform, reliable.

Look for the Red, White and Blue SOCONY Sign.

STANDARD OIL CO of NEW YORK

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POLARINE

In locating troubles it is only necessary to study the instruction book and wiring diagrams of the particular car worked upon. Like other electrical apparatus no attempt should be made to make repairs, as this should be left to the service station.

The maker's responsibility ceases if the regulator seal is broken.

The next point considered is the specific gravity of the electrolyte in the battery. Unscrew the caps and with the use of a hydrometer take the reading of each cell and compare each reading so you can tell if each cell is in good order. In every case the solution is returned to the cell it was taken from. These readings are taken before the distilled water is added. In a fully charged battery the reading would be between 1.275 and 1.300. Never allow this to fall below 1.100. So much for ordinary care. More serious ones should be left to the service station.

The ills of the starting motor are few and if any are present they are of a mechanical nature. On troubles such as dirty commutator and defective brushes sticking in their holders, and when due to grease and dirt, a drop of gasoline will be sufficient to loosen them.

TUNING UP FOR THE SPRING DRIVE.

(C. S. Barningham, Providence, R. I.)

Second Best Letter.

Half the ability to make an adjustment or repair lies in the discovery of its necessity.

Never tinker with the different parts of the car without first bringing a little intelligent consideration to bear upon the question of what is most likely to cause the difficulty.

With all adjustments carefully made and every bearing well oiled, the whole car will run sweetly and continue to run so, with only such little attention as is absolutely necessary. By neglecting details time is saved in getting away, but trouble is sure to come to one who does so. He who saves time in the garage will later spend time over expensive repairs on the road. Attend to the little things and the big things will not appear.

The most vital part of the automobile is the steering mechanism. Its failure to work is a dangerous thing. Constant use of the steering mechanism brings more or less wear and this is indicated by the looseness of the steering wheel. This wear is unavoidable, but at the same time it must be adjusted.

The parts of the car that the average man neglects mostly are the brakes. These should be inspected and put in the best of condition and kept so at all times, as they are of the utmost importance.

A point not always observed by the owner is that it is necessary to tighten the spring clips to their seats. These clips should be drawn tight once in a while, as spring breakage mostly occurs from loose clips. Even the best springs will become squeaky as soon as moisture enters between the leaves and causes rust. Graphite is to be preferred as the best lubricant because the graphite will remain between the leaves and continue to lubricate long after the grease itself has become dry. A spring treated in this way will not require lubrication again for a long time.

The removal of the carbon deposits at this time from the combustion chambers and on top of the pistons would be good judgment, as this operation, together with the grinding of the valves, helps most to keep the engine in a condition of highest efficiency.

Drain and wash the crank case with kerosene. After flushing fill with fresh lubricant of the best quality. Money spent in good oil is excellent engine economy.

Test the crank shaft bearings and wristpins for looseness and also see if the connecting rod bearings are tight.

To keep the transmission and differential in continual good working order and to minimize wear in their parts, it is necessary to keep them packed with good gear grease.

The clutch should be inspected and put in good working order, as the laying up of the car through the winter may have caused it to need attention.

The universal joint which is to compensate the twistings of the frame, should be well greased and kept supplied often.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

This is very essential. If any of the spokes in the wheels have become loosened, due to shrinkage of the wood, tighten up the flanges. Clean the wheel bearings and repack them with a good lubricant.

When too much oil is used the deposit of oil and carbon will stick to the inside of the muffler, choking up the passage so that the engine may become burdened with considerable back pressure. This should be attended and removed before the spring drive.

Inspect the rubber hose connections of the cooling system. It may become necessary to renew them. Also clean the radiator inside and remove mud and the like that may have clogged the air spaces on the outside.

It is not always possible to keep gasoline entirely free from water, which enters it usually by moisture and dirt. Drain and clean the gasoline line, tank and carburetor.

The generator, starting motor, distributor and magneto should be adjusted, but by an expert, as the average motorist is not so apt to be familiar with these enough to adjust them properly.

Look the wiring over to see that all connections remain tight and that the insulation of all wires remains intact.

One or more spark plugs may be fouled. These should be cleaned and the distance between the electrodes should be adjusted.

Test the storage battery. If it needs recharging have this done at once so as to be in condition when the car is ready for use.

Look over the top, curtains and upholstery, and if they need new celluloid lights, or if there are holes and torn places have them attended to.

Before putting the car again into service it is well to go over it very carefully and see that all nuts are tightened and cotter pins are in their places.

If all the above has been well attended to there is no reason for not enjoying the car this season as ever before.

A THOROUGH OVERHAULING OF AUTOMOBILE ENGINE.

(C. W. Agnew, Detroit, Mich.)

(Special Prize.)

In response to your request in the last issue of the Automobile Journal, I am sending you this letter. I expect that some of the statements may be disputed, and I hope they are, for no one knows everything, and if we can start a few arguments among the subscribers we may all learn something.

I have rebuilt engines in factory service for over a year; that is, rebuilt and tuned up old engines that were sent to the factory, and the facts I am giving were gained from my experience.

The most important part of the automobile to tune up for the "spring drive" is the engine. Of course every single part of the car is important and should be looked at, but I will deal only with the engine.

You often hear a man say that a car never runs like it did when it came from the factory. Of course he means a repaired car and he is telling the truth, but it is no fault of the car that it doesn't run as good. It is usually the fault of the man who owns it or else the fault of the mechanic. If the owner is willing to pay for new parts and for the time it will take to put his old car back into first class condition, he can have it run as good as it ever did.

It is not always necessary to do everything just the way I describe it. These instructions are for rebuilding an old engine so that it will run like new.

Disconnect the wires, oil and gas lines, etc., and take the engine from frame. Take off the flywheel, bottom pan, pull out the connecting rods and pistons and mark them all on the same side so that it will be possible to reassemble them and get them back into the engine exactly as they came out.

If the engine head is removable, take it off, being careful of the gasket. Remove the valves and camshaft. Next take off main bearing caps, care being taken not to lose the shims and don't forget to put a mark on each cap and also on the side of the crank case so that it will be easy to return them.

Now lift out the crankshaft and lay it in a safe place where there is no danger of it being accidentally injured.

Use gasoline to clean all the parts and wipe carefully

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Keeping Ahead

Conquering the heavy "gas" of today, and giving all the snap and pep of "yester-years", is the service that Bosch Magneto ignition provides those who are particular and who want the really best.

Don't take what you get—get what you want—a Bosch-Equipt Motorcar.

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MORE THAN 3,000,000 BOSCH MAGNETOS IN USE



MINUTE DEMOUNTABLE WHEEL

for Ford Cars

It's the biggest seller of the year, because it fills the greatest need.

Changes a tire in 60 seconds. One nut to unscrew that's all you do.

Retail Price - - \$30
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Reg. 7/8-inch
Titan

Albert Champion Means AC Spark Plugs

The Standard Spark Plug of America

LOOK FOR AC ON THE PORCELAIN

PERFORMANCES, not claims, are what count. AC is exclusive equipment on NINETY makes. There is an AC for every type of motor.

SOLE MANUFACTURERS

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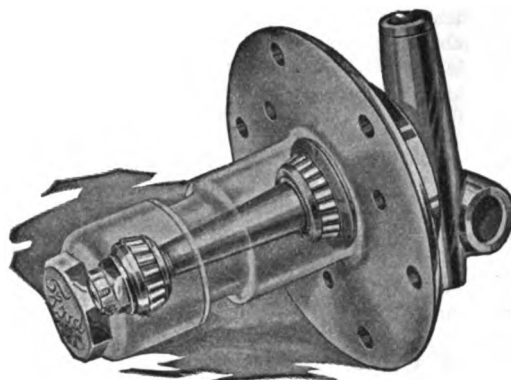
The chances are 4 to 1 that the bearings in your Ford front axle won't last 12 months. Why not anticipate the troubles bound to come through poor alignment and install Wright Taper Roller Bearings to prevent these troubles?

These unique roller bearings are identical in design with those used on the highest grade passenger and commercial vehicles. They'll outlast your Ford and will absolutely prevent misalignment of the front wheels and excessive tire wear. The use of demountable rims crushes the present Ford bearing. Wright Taper Roller bearings will carry this additional load. There's no difficulty in installing them as they fit the Ford without any changes whatever.

Price, \$10.00 per set

(4 Bearings)

In Canada, \$15.00



Wright Taper Roller Bearings Installed on Ford Front Spindle.

Dealers write Dept. M for proposition and details.

NATIONAL BEARINGS SERVICE CO. WRIGHT TAPER ROLLER BEARINGS

Replacements for all Standard types of Bearings

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Philadelphia

with a clean rag. Look into the cylinders and see that they have no deep scores, as if they have they must be rebored or else lapped out, the former method being the better.

Get some inside micrometers and check up each cylinder for taper and for out of round. A cylinder should not taper more than .001 inch. On an old engine there will probably be a difference of .004 inch to .006 inch or more between the top and bottom of the cylinder. In this case the cylinder must be rebored or relapped.

Look to the crank shaft and get a couple of V blocks underneath the front bearing journal and the rear bearing journal. If the engine has three main bearings it is possible to put an indicator on the centre journal and turn the shaft slowly to note how many thousands of an inch the pointer moves. If it shows over .002 inch it had better be straightened.

See how the bearings are, both main and rod. If there is not plenty of babbitt on them, get new ones. Take a scraper and get the scale off all bearings. Put Prussian blue on the bearing, using very little of it, just enough to cloud it up. Lay the shaft in the bearings and work it around so as to let the blue rub off on the bearings. Do this a few minutes and then lift the shaft off and the spot where the blue has been removed indicates where the shaft is touching the bearings. This is a job for an experienced bearing scraper and must be done by such a man.

Push the crankshaft towards either front or rear of the case to see how much end play it has. If over .008 inch to .010 inch it should be taken up in some manner, as it will later cause a knock. Look at all the main bearing journals and see that the shaft is perfectly smooth. This can best be told by rubbing the finger nail across it. If not smooth, take a piece of Crocus Kloth, or if this is not obtainable, a piece of "OOO" emery cloth is used with some oil. Wrap it around the shaft and wrap a couple of turns of belt lacing over it and then saw back and forth on the lacing, thereby causing the cloth to revolve, thus polishing the shaft.

Connecting rods should be marked up with blue, the same as the main journals, and when tightening be sure to take

out the same amount of shims on either side and then tighten up all nuts. The same rules applies to the main bearing caps.

Valves should be ground in until both valve and seat show a nicely polished streak that is unbroken. If the valves have a ridge on them, get new ones.

Push rods should fit same as valve stems. If there is a roller on the push rods, see that it is round and if it fits nicely upon the pin it is not necessary to change it.

The camshaft should be free, but not have over .002 inch play between the shaft and bearing.

Pistons should fit wrist pins snugly. If there is any play change them.

The wrist pins should fit the connecting rods the same way. If they do not, change the wrist pin or bushing. Pistons should fit their cylinder free. They should be fitted with a feeler or thickness gauge and should have an allowance of about .001 inch to .0015 inch to each inch of diameter of the piston.

Rings should be filed until they push all the way through their own cylinder, using a piston to push them through with. An old ring which is scored or has a black mark across its face or which has a gap between the ends of more than .006 inch should be discarded.

If the timing of the engine is not understood it is best to mark the gears where they mesh before they are taken off. Do this before the flywheel is removed and turn the flywheel until No. 1 and No. 4 (or No. 1 and No. 6), whichever it may be, dead centre mark is directly under the pointer. It will probably be marked (1-6 D. C.). Then when you put gears back it will be only necessary to turn the flywheel mark to the same position.

Look for broken teeth or worn gears. The only way to have gears run quietly is to keep changing them until they become quiet, but this is a job for a service station where they have plenty of gears on hand.

Put plenty of oil on everything as it is built up and run the engine slowly for two or three hours before it is given any work to do, as this will allow the parts to wear into their new positions, thus getting an efficient engine.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

PREPARING THE CAR FOR THE SPRING DRIVE.

(R. S. Albertson, Benton, Pa.)

Draw the oil from the crank case and flush with kerosene, also clean oil pump screen with gasoline. Look for loose bearings and nuts. Refill with new oil. Clean carbon from the cylinders and grind the valves. Be sure that the cooling system works properly. Clean all working parts (where lubrication is needed) with kerosene, then oil with a good lubricant. The weight of the body should be taken off the springs and the springs should be thoroughly cleaned between the leaves and properly lubricated. Remove all old grease from the transmission and differential and cleanse with kerosene and refill with new grease. Jack up the rear wheels and test both emergency and foot brakes. They should be adjusted so that the brakes take effect upon both wheels at the same time. (Be sure that the brakes work properly.) Test tires and inflate properly. The storage battery should be tested and put in proper condition. Examine all wiring. Draw all the gasoline from tank and clean sediment from same. Drain carburetor. Refill with gasoline. Examine the gasoline line and carburetor for leaks. All grease and oil should be removed from the mud pan and from the engine exterior. Start motor to see that everything is working perfectly.

CARBON ON CRANK CASE WALLS.

(A. W. L., Buffalo, N. Y.)

I have a 1917 model T Ford, run not quite 5000 miles. Last summer I used a well known brand of oil and last fall I changed to a lighter and cheaper oil. Have always changed the oil and washed out the crank case with kerosene every 700 or 800 miles.

A short time ago I removed the crank case cover and found a considerable amount of thin, flakey carbon. On looking to see where it came from I found it came from the under side of the piston heads and it could be scraped off in flakes, the oil evidently burning on from the heat of the explosions on the other side of the pistons. Bearings were O. K. and the engine positively has not been overheated.

Is this a usual condition or can oil be obtained which will not do this?

An analysis of your problem leads us to believe that this condition arises from using a poor grade of oil not suitable to your engine.

While this method may seem to be economy to you it will later develop serious trouble should you continue to use this same grade of oil. The very best oil is the cheapest in the long run.

To the lubricant falls the task of overcoming the destructive heat of friction. When the oil breaks down under the heat it loses all of its lubricating qualities, of course failing to separate the moving metal surfaces. In addition to this falls upon the lubricant the task of sealing the spaces between the piston rings and cylinder walls. This function permits the oil to be subjected to a very high temperature.

Of course you expect the oil you use will withstand the heat of service, prevent undue friction and give full compression and power to the engine, so the need of a proper, high grade lubricant is apparent.

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(L. E. S., Chester, Pa.)

Will you please explain to me, as soon as convenient to you, the vacuum and carburetor system on a 1917 Buick. Also explain adjustments.

The Stewart vacuum tank draws the gasoline from the tank at the rear of the car and delivers it to the carburetor at a constant head, as needed. The vacuum tank consists of two steel shells, the inner one, which encloses the float and the valve mechanism attached to the cover, while the outer one acts as the fuel reservoir and is connected to the carburetor. The float operates two small valves, which control openings connected to the inlet manifold and to the atmosphere. A flapper check valve closes the bottom of the inner shell. As the inner shell empties the float falls and opens the atmospheric valve.

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The suction of the motor tends to create a vacuum in the inner shell, drawing gasoline into the inner tank from the main gasoline tank. When the inner tank is filled the float rises, closing the suction valve and opening the atmospheric valve, allowing air to enter the inner tank through the vent tube, while the gasoline passes through the flapper check valve into the outer tank and from there to the carburetor. The action of this vacuum is entirely automatic.

The Marvel carburetor is used on the Buick and consists of a float chamber connected to the gasoline supply and a mixing chamber connected to the intake manifold.

The float chamber contains a cork float attached to a valve in such a manner that fuel is admitted to the carburetor only as it is needed to maintain a constant level in the spray nozzle, which is located in the mixing chamber.

The opening of the spray nozzle is regulated by a needle valve, which constitutes the gasoline adjustment of the carburetor, and it is surrounded by the venturi tube through which a portion of the incoming air passes at high velocity, picking up gasoline from the end of the spray nozzle.

The mixing chamber also contains the air valve and the high speed nozzle.

The air valve is held to its seat by an adjustable spring which forms the air adjustment.

The air enters the carburetor through a three-way valve connected to the air regulator on the instrument board. By means of this valve the air can be taken from the heater under the exhaust manifold or directly from the atmosphere. In the "choke" position this valve partly closes the air intake, causing engine to draw an excessive rich charge for starting.

The opening between the mixing chamber and the intake manifold is controlled by a butterfly valve, which is connected to the throttle lever and thus determines the amount of gas being fed to the engine.

The upper end of the mixing chamber and the venturi tube are surrounded by jackets through which some of the hot exhaust gas passes to keep the instrument warm and assist vaporization of the fuel. A damper in the jacket opening is connected to and controlled by the throttle lever so as to increase the amount of heat as the throttle is closed.

The adjustment of the Marvel carburetor is reviewed in our Buick overhaul article in the April 10th issue of the Automobile Journal.

(Continued from Page 39.)

Should the clearance between the spring shackles and the side of the spring become excessive there would develop a disagreeable rattle. This can be overcome by tightening the nuts on the ends of the spring shackle bolts. This will press the shackle together. In case these are badly worn a thin shim can be placed between the edge of the shackle and the end of the spring. If the rebound clips are loosened or worn, overcome by tightening the bolt which passes through the two ends of this clip.

TEARING DOWN THE REAR AXLE.

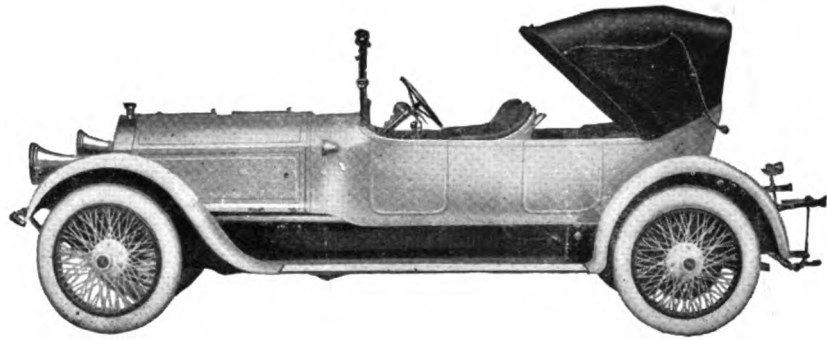
Block the front wheels and raise the rear wheels clear of the floor. There are several ways of doing this, but one of the best is by means of a chain block and sling underneath the rear of the frame.

Disconnect the drive shaft at the universal and the brake rods at the rear axle. Remove the rear spring hangers and loosen the spring clips holding the axle to the spring. The rear axle can now be slid out from under the car.

Remove the hub caps and nuts from the ends of the axle. Use a wheel puller to remove the wheels. Remove the truss rods. Remove the brake rods. Remove the nuts holding main drive shaft housing to the rear axle housing. Pull torque tube forward, removing it from the axle housing. The differential is bolted to this housing and will come out with it. This assembly should now be clamped in a vise and taken apart for inspection.

All parts should be washed carefully in kerosene. Examine the bearings to see if they are in good condition. Inspect the gear teeth and if these are found to have backlash after adjustment they should be replaced by new ones. The main point is to note throughout the assembly that all nuts and bolts are tightened. This will insure thorough quietness in the operation of the rear axle. In assembling the universal joint and rear axle all should be repacked with grease.

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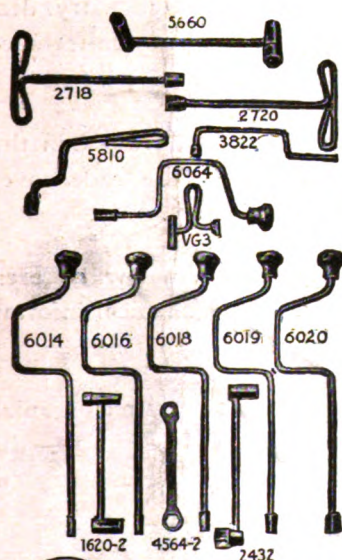
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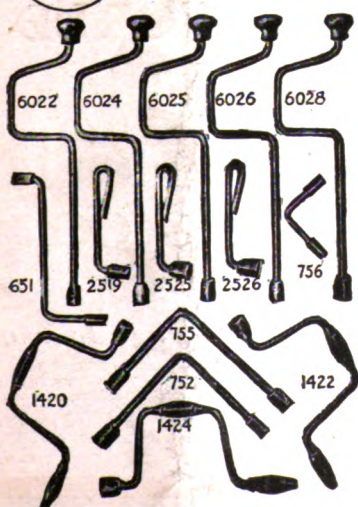
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PAWTUCKET, R. I., MAY 10, 1918.

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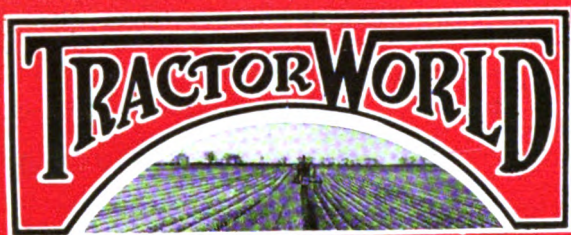
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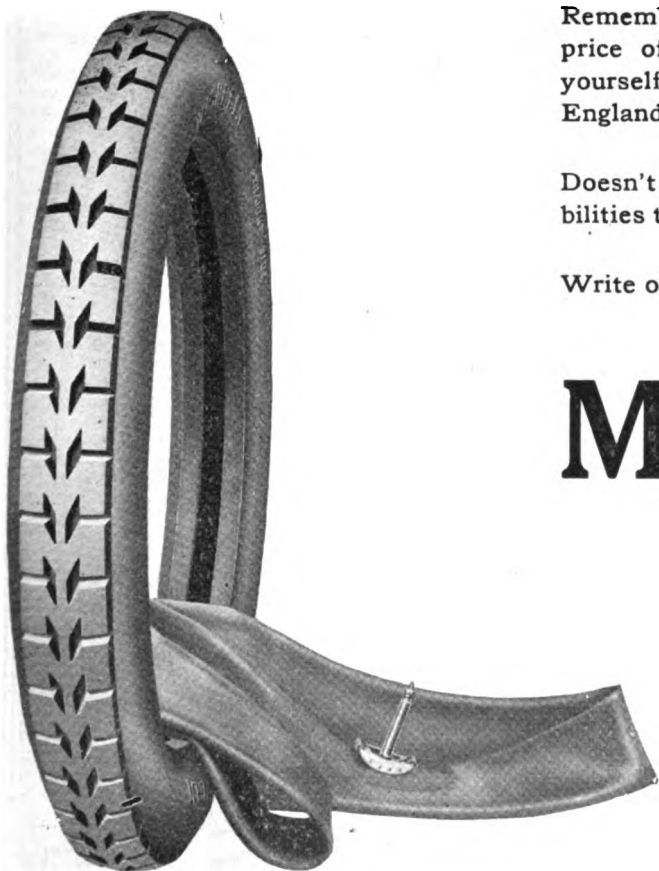
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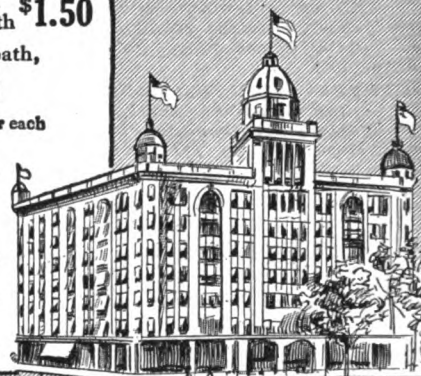
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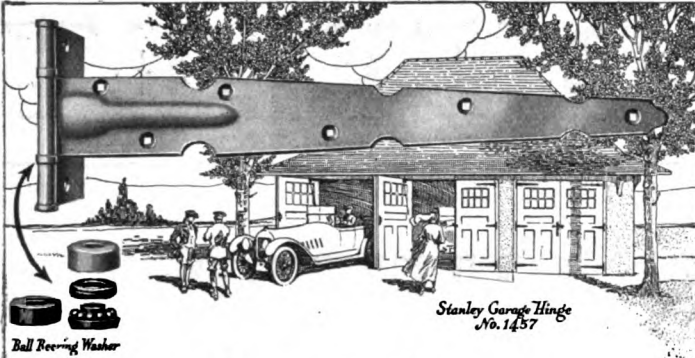
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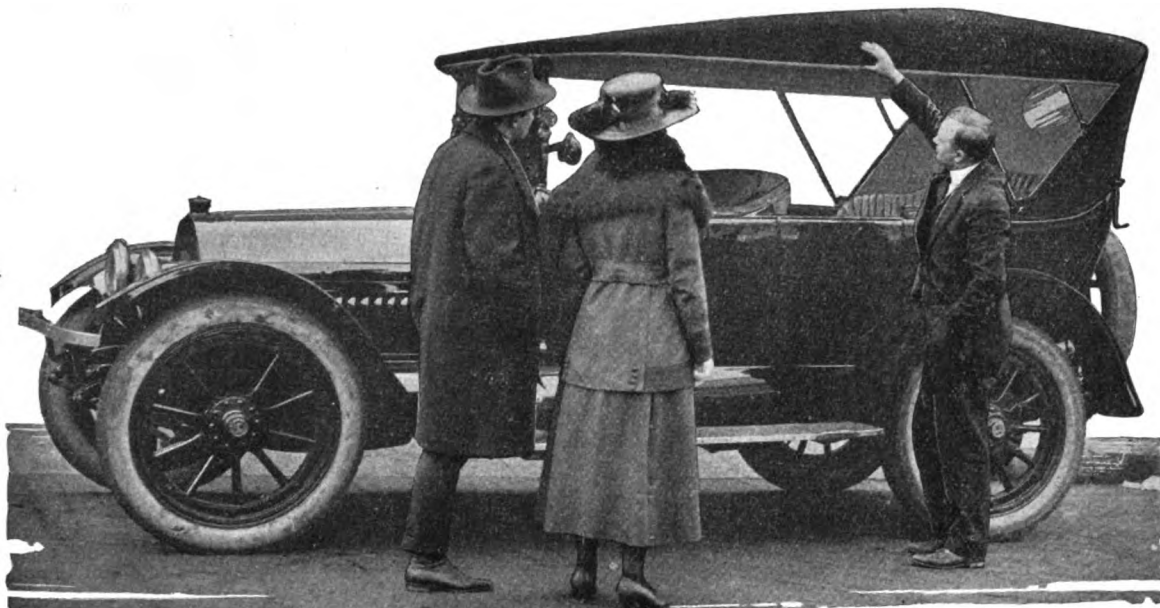
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The AUTOMOBILE JOURNAL

VOL. LXV.

PAWTUCKET, R. I., MAY 10, 1918. -

NO. 7.

Creating Artificial Leather From The Products of Dixie's Cotton Fields and the Chemical Laboratory

*A Wonderful Substitute For the Hides of Beasts That Is Now Being
Made In Enormous Quantities to Meet the Demand Created By The
Automobile For Upholstery Work and In the Trades and Arts*

Illustrations by Courtesy of Du Pont Fabrikoid Co.

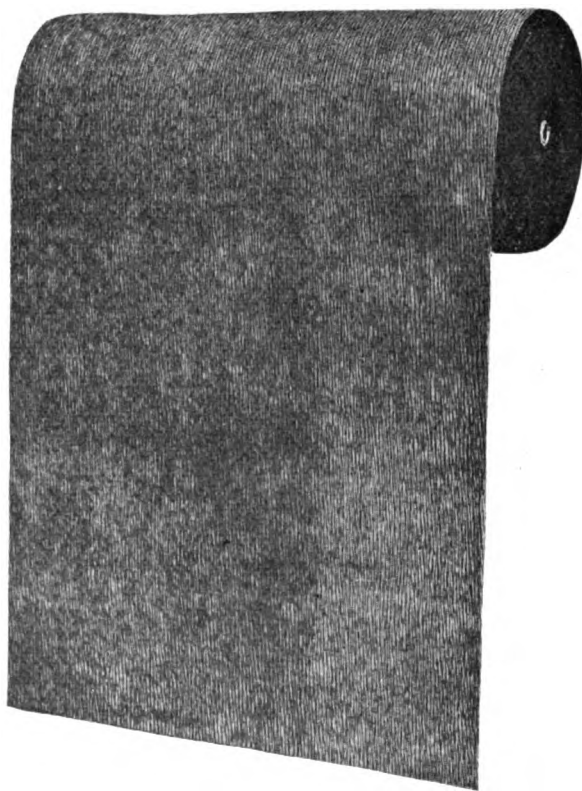
WHILE "necessity is the mother of invention," it has often happened in the history of the world's progress that some of the greatest discoveries and inventions came before the demand called for their creation. This has been true with many of the materials used in trade and commerce that were formerly secured solely from natural sources, but which are now produced almost entirely by synthetic or artificial means. In no instance is this so strikingly indicative of man's wonderful genius in combining the elements to obtain the same results as nature's laboratories, as is the case of artificial leather.

Has Superior Qualities.

While it must be admitted that the synthetic product will differ in a number of properties from the tanned hide of the beast, yet in the majority of ways in which leather is employed, and particularly upholstering, the artificial substitute has the advantage in most every respect.

Millions of motorists are today riding about in cars upholstered with artificial leather, a fact of which some are conscious and others have never given the matter a thought, yet neither class are acquainted with the interesting facts concerning its manufacture or the economic conditions that brought this substitute for the hide into such extensive use.

At this point it is interesting to divert from the subject temporarily to discuss briefly the ancient, but intensely inter-



A Roll of the Leather Substitute as It Goes to Market.

esting history of upholstering. Coeval almost with the first civilization of man, over 3000 years ago, an Egyptian artisan employed the skin of a bullock as a seat for a chair. Elaborations and improvements on this idea were many in the following centuries. It was soon learned that the full thickness of the hide made

it stiff, unwieldy and uncomfortable for upholstery, and that in the outer portion of the hide there were incorporated all the qualities making it valuable, such as grain, beauty, strength, resiliency and durability. From that time on up to the opening of the present century upholsterers always skived off the fleshy, pulpy inner portion of the hides and utilized only the upper half.

Automobile Created Demand.

With the growing demand for leather in all the arts and trades, leather manufacturers came to realize the great loss resulting from the method of handling hides, and when a still more imperative demand for economical handling of hides developed with the advent of the automobile, with its demand for 75 to 100 square feet of leather for the upholstery of each car, necessity again came to the rescue as the mother of invention and resulted in the development of an ingenious machine with which the manufacturers could split a hide into as many layers as desired.

The hide was no longer split in two sections, an upper and lower layer, and the latter discarded, but the first or outer thickness of good grain leather was removed and the remainder split into three layers, each weaker up to the last. A coat of dressing was employed to give the surfaces of these splits the appearance of a first or outer layer with its grain marks and the leather was frequently marketed as a first grade.

Car manufacturers, who were constantly trying to lower the price of their



The Hum of Thousands of Spindles Is Heard Where the Fluffy Staple Is Spun Into Thread for Making the Base Fabric.

products, experimented with these splits of leather, but to their sorrow, finding that they would not stand up in service for car upholstery, as they cracked, tore, disintegrated rapidly and soon lost their finish.

Manufacturers turned to the leather substitute, and that it met all requirements needs no stronger confirmation than is found in the enormous industry for producing it, that has been created by the demand. The leather substitute, by which is generally meant a cotton base fabric, coated with a pyroxilin solution, colored and embossed with the natural grain, has not come into use because of conditions created by the war, but has been in use for 40 years and was first manufactured, though not on a commercial scale, over 60 years ago. The leather substitute product of today, however, is as far superior to that of 10 years ago as it is to one of the secondary splits of real leather. It has the appearance and soft, glovey feel that is found in the best grades of leather; has greater tensile strength and durability than the split grades of leather and retains its attractive appearance indefinitely. Because of the porosity of leather it has numerous disadvantages as compared with artificial leather, which is absolutely sanitary, water, grease, dirt, stain and vermin proof. It can be cleansed thoroughly with soap and water.

Through these qualities it appeals to the up-to-date manufacturer and the public as superior to leather in an astonishingly diversified number of uses. Its value has already been demonstrated for use in furniture and automobile upholstery, automobile and carriage tops, bags and suit cases, book binding, trunks,

camera cases, manicure, jewelry and instrument cases, hand bags, harness, clothing, gloves, puttees, counter mats, gun cases, pillows, hats, toys, belts, storm aprons, baseballs, leggings, shoes, military vests, car curtains, vestibule curtains and novelties of every description.

Largely a Cotton Product.

It is difficult for the average person to realize that the leather substitute is largely a cotton product, both as to base and surfacing, as there are no two commodities that seem to have so little in common as regards qualities and uses as cotton and leather. The comparison, however, is a little far fetched, as while the commercial product, leather, is a real leather, the leather substitute is only partially cotton and that part is cotton cloth, while the other part, which is derived from cotton, is made from the staple after it has been dissolved into its elements.

Leaving the southern gins where the boll is bereft of its seeds it goes to the mills, where it is carded, spun and woven into an extra grade of strong cloth, both the warp and woof being made of selected threads, as the finished fabric must be of unusual strength to withstand the strains and wear.

The dyer handles the cloth in the next step of production, placing it in huge vats, where it is impregnated thoroughly with the dyes and is shrunk so that it will neither stretch or sag. It is then passed over heated cylinders in the drying process, after which it is ready for its magic coat of solution that gives it the quality and appearance of leather. The expression "magic solution" is appropriately used in this case, as the se-

cret of this remarkable product is tied up in the concoction and ingredients of this mixture, in the preparation of which no expense or pains are spared, for on it the success of the surface and consequently the value of the finished product depends.

As previously stated this solution has a base of cotton, the staple being thoroughly cleansed of all impurities, after which it is nitrated by being soaked in mixed acids. Following this process the cotton is carefully washed in a number of washings and thoroughly dried, when it is dissolved in chemicals of different kinds, the solution being colored to reproduce the desired tint or color.

In the handling of this solution is also the secret of obtaining realistic effects in the finished product, and varying qualities are secured in its application to the fabric, which is coated with varying amounts of the solution by being passed through long machines that lay on films of even thickness and uniform quality. There are a large number of uses for leather substitutes which require an exceedingly thin and pliable fabric, for which product the use of light cloth and a thin coating is necessary. Other demands require a thick and exceedingly strong product, the manufacture of which requires the use of a heavy cloth and thick coating.

Successive coats of the pyroxilin solution are applied until a tough wear resistant surface is built up on the cloth, when the surface is ready for the graining that gives it the appearance of an exact replica of natural leather. The embossing process is employed in graining the surface and is the last in the series of processes in fabricating the leather

substitute before it is placed on the market. It is also the most interesting, if not the most difficult of all, as the natural markings of the genuine hides are transferred to steel plates and rollers, which reproduce them in the most minute detail upon the pyroxylin surface of the product. The plates and rollers are heated with the result that the grain is embossed so that its permanence is as lasting as the material itself.

Practically any effect can be obtained in this finish. The appearance of the most elaborate Moorish leather, where two colors are essential, may be duplicated, or the characteristic markings of pig skin, alligator or other expensive natural leathers. Different degrees of lustre can also be obtained upon the finish to meet requirements of any demand and before passing along to the shipping room the product undergoes a series of exacting inspections and is rolled up in rolls of different lengths and widths.

The cost of machine buff upholstery leather, with which most of the better cars using leather are upholstered, is now about 32 cents per square foot and there is at least one foot in every four wasted in trimming the irregular edges and eliminating weak and imperfect spots. The best grades of leather substitutes cost the manufacturer about 14 cents per square foot and there is practically no waste because the material comes in long rolls of absolutely uniform width and quality, giving practically 100 per cent. upholstery efficiency.

Another great saving effected in the use of the leather substitute for upholstery is in labor costs. An expert leather cutter, in a day of eight hours, can only cut the leather necessary to upholster 30 medium sized roadsters, while a man and a boy working eight hours with a single electric cutting machine can cut enough artificial leather in eight hours to upholster 384 cars.

Waste in Trimming Leather.

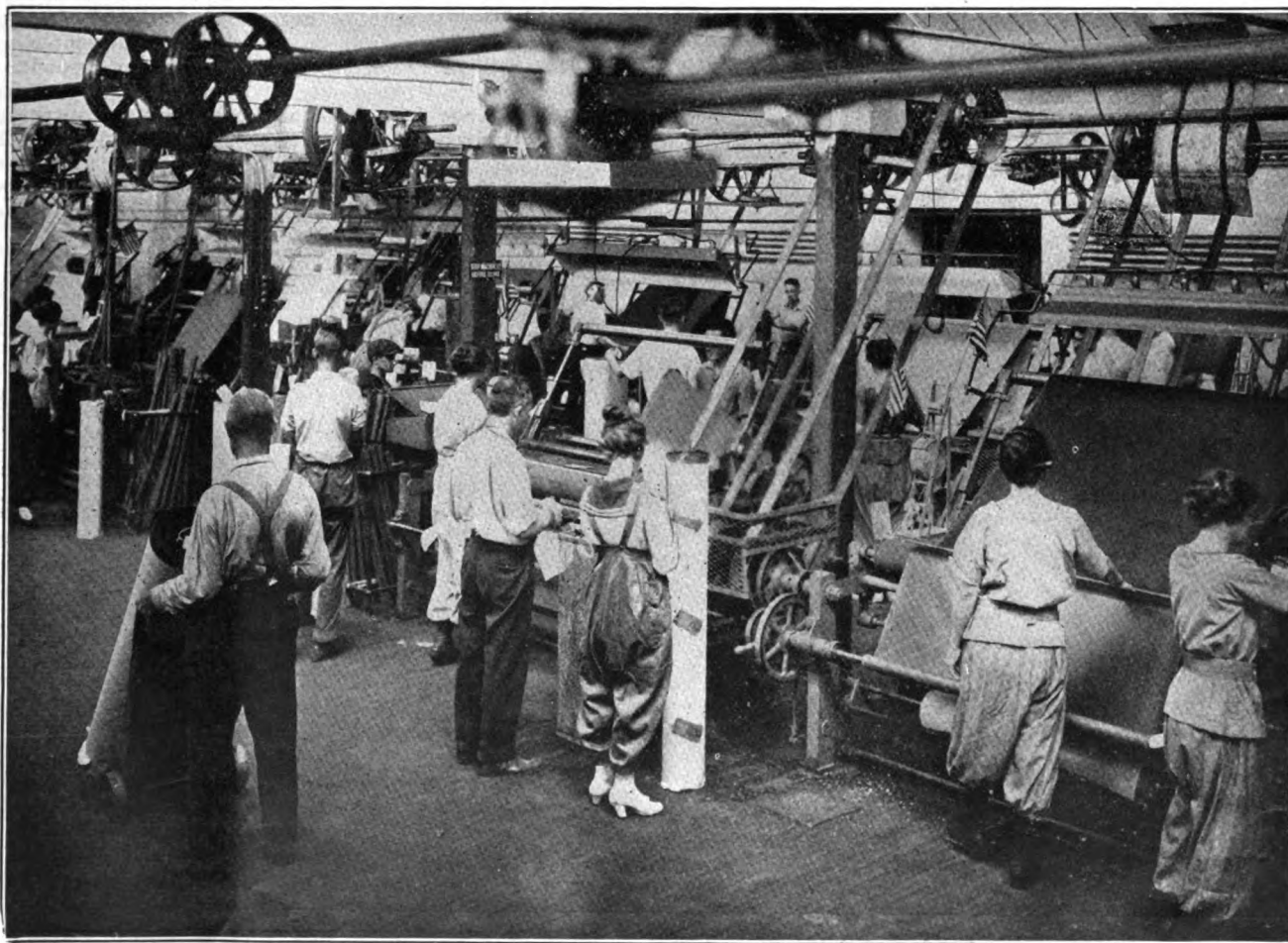
Work at this rate is turned out in one of the foremost trimming shops in the country. It took the man and his helper one hour and 40 minutes to lay out 40 thicknesses of artificial leather upon the cutting table, to mark out on the same two sets of each of the 20 pieces required for each car, and to cut out the 80 sets of pieces and clear the table for the next lot. If called upon for a greater output this cutter, working on the leather substitute, said he could lay out and cut 50 thicknesses at a time and so increase his output by 25 per cent. if necessary.

A greater saving even is effected in cutting the thinner grades of artificial leather, which are used for door linings and other parts of the trimmings, the cutter laying out and cutting 100 thicknesses. One cutter working at the Ford plant where all the material for both tops and upholstery was cut up by 14 men with 14 electric cutting machines working eight hours a day, stated that this force of cutters were turning out

more work than 150 men could turn out working on leather.

Still further economies are to be obtained with the substitute for leather, of which the most important is that effected in sewing the various pieces of upholstery together. The material being of uniform width, the patterns are laid out so as to require a minimum number of pieces. The number of pieces in the pattern is always larger when leather is used, because of the necessity of using as many small pieces as possible to save them from being discarded as scraps. It may not be generally known that the popular style of French pleated upholstery is exceedingly wasteful of leather, because it requires much larger sections than the old diamond tufted upholstery, where each diamond could use a small piece.

In the final operation of putting the upholstery on the car, comes another saving of almost equal importance as those already enumerated. Workmen state that it is practical to use four-ounce tacks when using leather substitutes against six or eight-ounce tacks when upholstering with leather, and that it is not necessary to drive as many tacks with the former. The leather being weak in spots it is necessary to drive larger tacks and more of them to be sure that it would not pull away when stuffed and stretched. Even with this precaution it frequently does tear out in weak spots and requires considerable extra work to repair. A concrete illus-



Girls Dressed in Bloomers Carefully Scan Every Inch of the Finished Product to Detect Any Flaws or Imperfections.

tration of the saving effected with the leather substitute is given in the fact that in one plant men were receiving \$2.70 for each car trimmed with artificial leather, while the rates for trimming the same sized car with leather ranged from \$4.50 to \$5.25 on account of the greater care and longer time required to perform the work with leather.

Qualities and values of leather vary so greatly that there can be no fair or absolute comparison made with the artificial product, but the latter are similar in the essential qualities, which are tensile strength and durability. In fact, it has been proved that the best upholstery leather substitutes have twice the tensile strength of the ordinary split leather and will wear much longer without cracking, peeling or wearing through the coating and becoming shabby. For this reason alone practically all the popular priced manufacturers adopted leather substitutes in place of the split leather, as they give service at least the equal of that obtained from the average grade of machine buff leather. No claim is made, however, that the substitute for upholstery is equal to genuine hand buff leather, such as is employed in the higher priced automobiles. On the other hand, as previously mentioned, the artificial leather has numerous service qualities, as well as points of advantage that even the first grade of leather cannot offer. The owner of a car upholstered and finished in a first grade artificial leather has no worries over keeping the material in good condition, as it requires no other care than an occasional cleaning with soap and water and if, after long service, the coating wears through and shows the fabric base at any place, this worn spot can be renovated by an application of any of the leather reno-



Trained Girls Who Inspect the Finished Product.

vators of the pyroxylin type that are on the market.

Used on 75 Per Cent. of Cars.

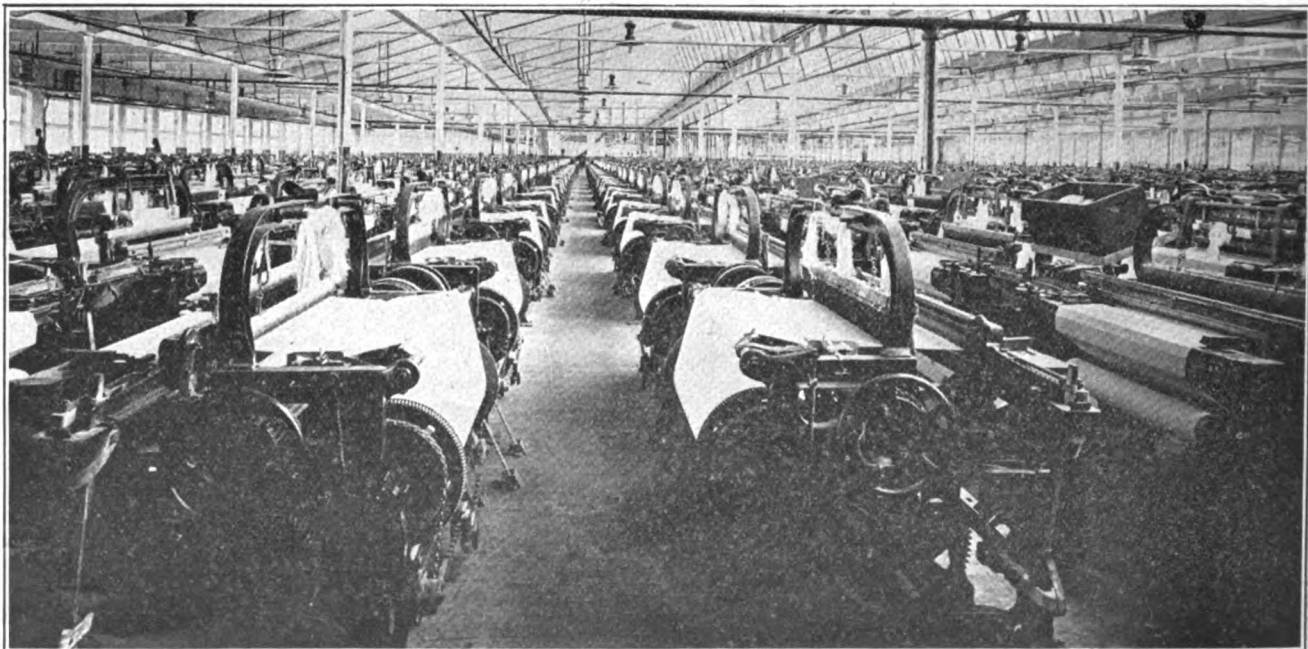
As the automobile industry uses more upholstering materials than any other in the world, it is but natural that it should be the greatest consumer of the leather substitutes, although carriage makers also consume enormous quantities. In these two lines alone over 25,000,000 yards of leather substitutes are used annually, including not only imitation leather of the pyroxylin type, but also the various rubber coated materials used chiefly in carriages and low priced automobiles. In the upholstery of automobiles another 10,000,000 yards of leather substitutes are used annually. Over 75 per cent. of the popular priced cars manufactured in this country last year were upholstered in these leather substitutes of one kind or another.

There are other reasons, however, besides those of quality and first cost, that have been instrumental in making the leather substitute so popular for upholstery and trimming purposes. Its use effects numerous economies in handling

as compared with the labor costs on leather, because it lends itself perfectly to standardized methods of manufacture, as every piece is the same and works up the same, the material goes through the factory and can be handled like so much iron or steel.

Certain grades of the product have been adopted by the United States government for use on all ships of the new merchant marine, after tests were made to establish its economy over leather, and as to its service qualities. This grade undergoes the most severe service in marine work, as in addition to being extra strong and durable, it must not be affected by mildew or mould upon exposure to either fresh or salt water.

The use of the leather substitute does not necessarily result in inferior service or the acceptance of something as an expedient, as it has both the appearance of the real article, together with the wearing qualities. An interesting incident, illustrative of this fact, happened about five years ago when one of the leading artificial leather manufacturers induced one of the largest automobile manufacturers to adopt the leather substitute. The latter was naturally slow to accept the claims made by the former, as one season's output of cars upholstered with an unsatisfactory material, might have spelled his ruin. The manufacture of the artificial leather substitute overcame the car maker's skepticism with a guarantee of \$500,000 to reimburse him for any expense due to defective goods. During the 12 months following the acceptance of this agreement the artificial leather manufacturer was called upon to replace but one seat valued at \$4.50. This was only claim made against many hundreds of thousands yards of material used.



Hundreds of Looms Weave the Extra Grade of Strong Cloth from Selected Threads.

Car Curtailment May Now Be 75 Per Cent

Conference Held This Week Between
War Industries Board and Automobile Manufacturers.

The War Industries Board acting in conjunction with P. B. Noyes, chief of the conservation division of the United States Fuel Administration, has practically decided upon a curtailment of car production of approximately 75 per cent., according to dispatches from Washington bearing on the conference held early this week between the Federal authorities and the automobile manufacturers.

No official announcement was made by the government or automobile producers as to the outcome of the conference, but it is understood that the production curtailment demanded will be at least 75 per cent. and possibly more. It is also understood that the principal reason for the curtailment is to conserve fuel rather than to save steel.

Chairman Baruch of the War Industries Board, who presided at the meeting, appointed a committee to further consider the matter and named the following as members: For the War Industries Board, Alexander Legge, J. Leonard Replogle, George N. Peak and Hugh Fraire; for automobile producers, W. C. Durant of the General Motors Co., John N. Willys of the Willys-Overland Co., John F. Dodge of Dodge Brothers and Walter Flanders of the Maxwell Motor Co.

NEW ELGIN SIX MODEL WITH DISTINCTIVE DESIGN.

The Elgin Motor Car Corporation, Chicago, is building a new four-passenger model, which will be known as the "Military Scout." While it is of similar lines to the sport type and is classed as a four-passenger car, it will seat five persons comfortably.

The creation of this new model was the result of the wonderful record made by the Elgin Six "War Scout," a standard touring model, which made a run of 6202 miles from Chicago to San Francisco and return, with hood, clutch and transmission sealed during the entire journey. The body is of distinctive design, straight-line type, with beveled edge and full size rear fenders. It sells for \$1195 f. o. b. Chicago.

WESTINGHOUSE EMPLOYEES RAISE \$2,000,000 FOR LIBERTY.

A total of \$2,144,800 subscribed by employees is the record of a 10 days' Liberty Loan Campaign in the organization of the Westinghouse Electric and Manufacturing Co. With 30,384 subscribers from the company's various plants and district offices, the quota set for this and

the total subscription figures was largely exceeded.

Mass meetings at the noon hour addressed by four-minute speakers recruited from the shop employees were an important feature of the campaign. At one such meeting, held at East Pittsburgh works, several thousand people listened to Sousa's band and were addressed by Major Watt of the Gordon Highlanders. The Westinghouse and Scotch Kilties bands played at other similar meetings.

Due to the general enthusiasm and particularly to the efforts of the campaign committees, many departments were able to display "100 per cent." signs. Where one or two persons hung back, the force of public opinion quickly brought them into line.

About 1200 of the company's women employees marched in the Liberty Loan Parade in Pittsburgh on April 20, banners designating their work, and were accompanied by both the brass and bagpipe bands.

Link Henry Ford's Name With The Presidency

Reports from Michigan Say He Will Be
Candidate for Senator at
Next Election.

News dispatches emanating from Michigan reported recently that Henry Ford would be a candidate for the Republican nomination for senator from that state during the coming campaign.

No corroboration of the report has been received as yet from the famous automobile manufacturer, but some of his friends are quoted as saying that he would not remain as senator over a year if elected, but he would become a candidate for the Republican nomination for President in 1919.

NEW DORT CAR MODEL IS "FLEUR-DE-LYS" ROADSTER.

The Dort Motor Car Co. is marketing a new model of its "Fleur-de-Lys" roadster. It is a three-passenger car of the cloverleaf type, with divided front seats and a divan in the rear.

The lines of the new Fleur-de-Lys vary considerably from the preceding model. The most noticeable change is in the sill curve at the rear and increased room. The divan is wider and there is more leg room. The standard paint is gray body, hood and wheels, with a white stripe just below the sill. The fenders and radiator are black. It carries a mohair top.

The body is mounted on the model 11 chassis, with the new 3½x5 motor and the same other refinements brought out in the touring car chassis introduced last January.

N.A.D.A. Asked To Indorse Federal License Bill

Senator Pittman's Measure Provides for
Reciprocal Privileges on All
Car Registrations.

The members of the National Automobile Dealers' Association have been asked for their indorsement on the U. S. Senate bill 31 introduced by Senator Pittman of Nevada, which would require that each state shall recognize the registration plates issued by every other state.

The bill deals with the question under the head of interstate motor traffic and has many adherents, particularly since the recent numerous prosecutions against operators of cars who were passing through Pennsylvania and several other states en route with cars being driven from the factories to eastern seaboard cities for delivery. In many cases these arrests took the form of petty prosecutions, which were to be deplored, particularly at a time when the nation's system of railroad transportation is so congested that the overland delivery of automobiles is a patriotic conservation of the country's facilities to win the war.

President Vesper of the N. A. D. A. was in Washington when the bill came up and it was suggested to Senator Pittman that the bill be changed to specially cover cars en route on driveways passing through different states.

PRO-MO-TOR FABRICATING CORP. WILL HANDLE HERZ PLUG.

Pro-Mo-Tor Fabricating Corp. has been formed under the laws of New York for the purpose of distributing the Herz plug and other specialties made by Herz & Co. of New York. Its president is Russell A. Cowles, president of the Ansonia Clock Co., Metals Trading Corporation, and vice president of Ansonia Brass Co. Gustave L. Herz is vice president and general manager; Edward S. Rothchild is treasurer, and Mark Eisner secretary and counsel. Benjamin Liseberger is the remaining director. An energetic advertising and selling campaign will be inaugurated and the plant of the company has been considerably enlarged and new equipment acquired. It is planned to enlarge the scope of activity while preserving the recognized quality of plug.

BOSTON MICHELIN BRANCH HAS NEW DELIVERY TRUCK.

The Boston branch of the Michelin Tire Co. recently placed in service a new delivery truck to meet the demands of its increasing business and to facilitate prompt deliveries to the trade in Boston and Greater Boston. Having both rail and water connections with the plant, the branch keeps its large stock of tires constantly replenished.

New York Has New Headlight Law

Secretary of State Will Have Power To Name Such Devices as Meet Requirments from Tests

Governor Whitman of New York on May 8 signed the new headlight law recently enacted by the Legislature of that state and it will immediately be put into effect.

This law was designed to eliminate the confusion resulting from the inability of motorists to comply with the old law satisfactorily and was drawn following a lengthy conference in the office of Secretary of State Hugo, which was attended by headlight experts and others. The law confers on the secretary of state the authority to officially name such headlights as come within the requirements following tests before technical experts or boards.

The new law states that any person or concern may submit to the secretary of state a device for controlling the front lights of motor vehicles to the end that this device shall then be submitted to a test by the United States Bureau of Standards or any qualified testing laboratory not interested in any way in lamps or headlighting apparatus, or to a disinterested, qualified technical expert or experts from the physical laboratory of a university or technical school in this state. The fee will be \$50. The secretary of state is also given the power to test out the device on the road as he may see fit.

Following a notice from the bureau, laboratory or technical expert testing the device to the effect that it complies with the provisions of the law and suggesting the maximum candle power to be used with it, Secretary Hugo may then issue a certificate to the effect that the test has been made and that the device meets with the law and prescribing the candle power to be used. Those dissatisfied with the results of the test are given the right of appeal to the United States Bureau of Standards, whose decision shall be final. Among the other new provisions of the law are these: Every motor vehicle when running shall display from one-half hour after sunset to one-half hour before sunrise at least two lighted lamps in front of approximately equal power, but not exceeding 24 candle power unless a greater power has been prescribed under one of the subdivisions of the new law. The lighted lamp in the rear must be such that the numbers of the license plate are legible at least 50 feet away.

The front lights must be so adjusted and operated as to avoid dangerous glare or dazzle, and so that no dazzling light projected to the left of the axis of the vehicle when measured 75 feet or more ahead of the lamps shall rise above 42 inches on the level service on which the vehicle stands. There must also be sufficient side light to reveal any object 10 feet to both sides of a car at a point 10 feet ahead of the lamps. All this, how-

ever, which has been a puzzle to 99 out of every 100 motorists, will be taken care of in the tests. Lists will be furnished by Secretary Hugo, making public, as is the case in other states, of lights that come within New York's law.

The law further states that front lights are to be visible at least 250 feet in the direction in which the car is going, and when it is on a highway not well enough lighted to reveal any object straight ahead 200 feet away, such front lights shall be of sufficient intensity to reveal that object at least 200 feet away. This, however, is not to apply to motor trucks, described in sub-division four of the law.

On motor trucks of two tons carrying capacity or over, so constructed that they cannot exceed 15 miles an hour, the lights shall be visible at least 200 feet, and where the vehicle is on a highway not so lighted as to reveal any object straight ahead 200 feet, the front lights shall be sufficient to disclose any object 75 feet ahead. Motor vehicles when standing must display two lights in front and a red one in the rear, visible at least 100 feet distant.

Will Eliminate Number of Tire Sizes

Rubber Industry Will Take Step as Means of Conservation, as Well as for Benefit of Trade.

The pneumatic tire division of the War Service Committee of the rubber industry has recommended the standardization of tire sizes and the gradual withdrawal from trade of certain sizes which are considered obsolete or unnecessary. The War Service Committee is selected from the rubber manufacturers of the country and is acting in this matter with the conservation division of the War Industries Board at Washington.

"While this is a logical measure for the conservation of the stocks of raw and finished materials," says J. N. Gunn, president of the United States Tire Co., "it will prove of greatest economy after the war because of the saving it will make possible to the tire companies and dealers by greatly reducing the number of sizes and styles to be manufactured and carried in the many branch and warehouse stocks established throughout the United States for the distribution of the product to the consuming public. The consumer will also be greatly benefited."

The plan has been presented to the directors of the National Automobile

Chamber of Commerce, which has voted to ask all its members to adopt the new standard of tires as original equipment as rapidly as possible, commencing this year.

Among the economies which will result from standardization and the discontinuance of unnecessary sizes those who have examined the plan have pointed out two as of chief importance. Dealers will no longer need to carry the wide range of sizes heretofore necessary if their stocks were to be considered at all representative, and that portion of the manufacturer's raw material heretofore set aside for production in sizes and types of tires which are known as "slow moving" will be available now for manufacture into sizes which move quickly.

Manufacturers of passenger automobiles are to be asked to fit their future production with one of the following sizes of rims: 30x3½, 32x3½, 33x4 and 34x4½. These are to take tires of those sizes, with the following respectively as over sizes: 31x4, 33x4, 34x4½ and 34x5. For trucks there are to be three standard sizes of pneumatics: 36x6, 38x7 and 40x8. The two sizes that fit the smallest rims are designed to be of clincher type; all others to be of straight side type. Both plain and non-skid types are to be retained.

In classifying sizes for present or future elimination from manufacturing schedules those which are to be dropped at once contain only tires which sales records of the principal companies show are no longer in demand anywhere.

The next class embraces tires in sizes which have not been furnished as equipment for a long time. They are practically obsolete, though sales records still show a slight trace of demand for them.

A still larger group of sizes no longer furnished as standard equipment with any car, but still in service among many of those cars now running is recognized in another classification. It is felt that in setting a date in November, 1919, to drop these sizes, ample allowance has been made for cars which use them to outlive their usefulness.

Other provisions are made for still further extensions of time on sizes that are at present in active demand for equipment replacements through regular trade channels. There is too a sentiment in well informed quarters that any of the arrangements now contemplated affecting cars of current models should be subject to such necessary adjustment as need of those cars two or three years from this time may indicate as advisable.

The recommendations of the committee mean that after the needs of all cars running shall have been served throughout the period of their existence and automobile makers have brought their own production into line to conform with the new recommendations pneumatic tires will be made in but six sizes for passenger cars and three for trucks, with four sizes of rims for passenger cars and three for trucks instead of the present indefinite number listed by the various manufacturers.

Exports Increased in March Over February

Shipments of Motor Cars, Trucks and Parts Showed Substantial Gain, but Are Still Below Last Year.

Exports of motor cars, trucks and parts during March showed a substantial increase over the February figures, but are still below normal, and only 80 per cent. of the total for March, 1917. The valuation of the exports for last March was \$8,191,305.

For the nine months ending March 31, 1918, the exports of cars, trucks and parts amounted to \$86,093,407, approximately the same as for the corresponding period a year ago. Including the value of the airplanes, motorcycles, gasoline engines, tires, magnetos and spark plugs exported, the March exports were \$15,087,310.

A total of 620 trucks were exported during March as compared with 765 in February and 1040 in March, 1917. Great Britain and France took 298 of these and Canada 132. Passenger car shipments increased from 3551 in February and decreased from 5755 in March, 1917, to 4249 last March, the value was \$3,981,016. Argentina took only 79 cars, as compared with 335 in February. Chile took 137 as compared with 191 in February.

Trade with the Orient showed an increase and Australia took 248 cars as compared with 144 in February. British India took none in February, but 25 in March. Russia took none and Norway one.

During March 10,215 engines, including motor car, truck, marine, tractor, stationary and creeper type gas engines were exported. The value of these footed up to \$4,420,831. Tires amounted to \$934,631 and magnetos and spark plugs, \$318,333.

PRESIDENT KETTERING SPEAKS ON ENGINE DEVELOPMENT.

President C. F. Kettering of the S. A. E. in a lecture on the "Automobile Power Plant" before the American Institute of Electrical Engineers, the American Society of Mechanical Engineers and the Western Society of Engineers, predicted that the future internal combustion engine will be encased in an asbestos jacket in much the same way as a steam engine, and that better thermal efficiency will be realized by placing a bypass in the water outlet operated in conjunction with the throttle lever. He outlined the principles of operation of the internal combustion engine, discussed the preignition knock theory and touched on the developments leading to the design of the Liberty aviation engine.

J. A. SCHLECHT RE-ELECTED HEAD OF ST. LOUIS ASSOCIATION.

The St. Louis Automobile Manufacturers and Dealers' Association has re-elected Joseph A. Schlecht of the Mound City Buggy and Auto Co. as its president. The other officers follow: Vice president, P. H. Brockman, De Luxe Auto Co.; treasurer, H. L. Schnure, Velie Automobile Co.; directors, F. W. A. Vesper, Vesper-Buick Automobile Co.; F. R. Tate, Tate-Gillham Motor Car Co.; I. G. McNiece, Cadillac Automobile Co.; W. L. Johnson, Johnson Automobile Co.; W. S. Roberts, J. I. Case T. M. Co., and C. R. Frampton, Hudson-Phillips Motor Car Co.

Pierce-Arrow Co. Subscribe Nearly \$1,000,000

One Employee Pledges Whole Salary and Takes Overtime Job to Secure Living Expenses.

The Pierce-Arrow Motor Car Co. in the Third Liberty Loan campaign subscribed nearly \$1,000,000. At the close of the campaign it was found that the employees, numbering nearly 10,000, had rolled up a total of \$563,500. This exceeded by far their records of the First and Second Liberty Loan campaigns.

The officers of the company responded no less generously in proportion, subscribing to \$112,350 in bonds, while the company as a corporation subscribed to \$250,000 worth of bonds. Including the \$10,000 subscribed by the Employees' Benevolent Association, this brought the grand total to \$935,650.

"The magnificent response of Pierce-Arrow employees in the Third Liberty Loan campaign was particularly gratifying," said Henry May, vice president of the company. "Not only did it proclaim to the business and industrial world that they stood ready to support their country in the fullest measure, but it demonstrated that the Pierce-Arrow spirit is thoroughly American."

"While practically every man and woman employed by the company eagerly assumed his or her full share of responsibility, there were a number of instances of unusual sacrifices that were notable. In one case, an employee of Italian descent, subscribed to bonds that necessitated devoting his entire weekly wages to make the percentage payments for them. To do this he made arrangements to work nights to supply him with immediate needs."

Those on the general committee were: Henry May, chairman; W. C. Wrye, H. K. Thomas, G. W. Cooke, F. B. Spencer, E. F. Himmele, F. C. Browne, Robert Gerlach, Walter Newsome, F. B. Hubbard, S. O. Fellows, C. I. Sheppy, C. D. Cowles, J. W. Henafelt, E. D. Morton, Miss E. Borbush and Miss A. L. Cowan.

GREAT BRITAIN PREPARES FOR MOTOR ACTIVITY AFTER WAR.

The British government is planning to give the motor industry special attention after the war, as is indicated by the fact that the minister of reconstruction, who has 87 different committees under his direction, has authorized the formation of a branch committee for the automobile industry, and has appointed H. C. B. Underdown to act as chairman.

Mr. Underdown in consultation with the association of British Motor and Allied Manufacturers, has formed his branch committee from well known men in the automobile industry. The committee includes Bernard Caillard, who is a director of Wolseley Motors, Ltd., and is also managing director of the British Lighting and Ignition Co. J. W. Stocks, general manager of Components, Ltd., represents the motorcycle industry in the committee. Others on it are Horace Wyatt and Edward Powell. Arrangements for forming sub-committees representing the various branches of the industry are being made, so that through these channels the entire industry will be represented in the ministry of munitions.

Big Increase in Production of Gasoline

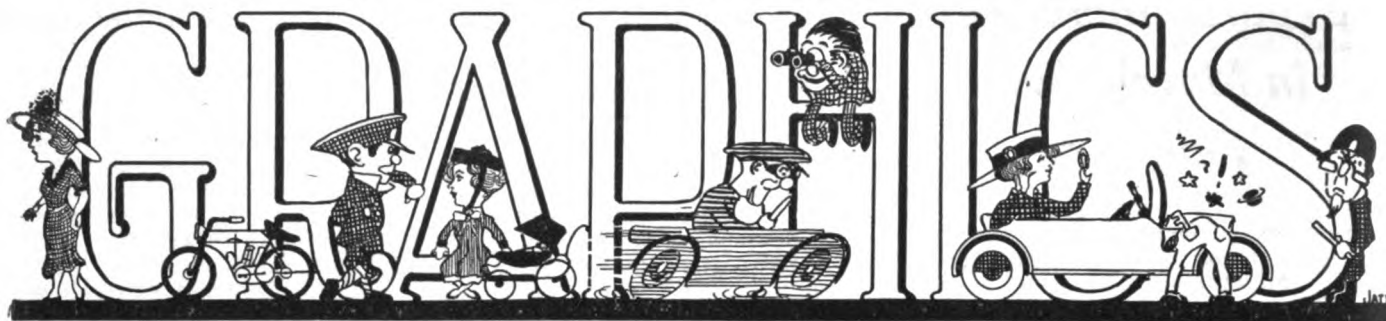
Gain of 32 Per Cent. in Output of Motor Car Fuel During 1917, or 7,478,630 Gallons a Day.

Last year there was a 32 per cent. increase in the production of gasoline, or nearly 2,000,000 gallons per day more than in the previous year, according to the figures of the Bureau of Mines. The actual daily increase in gallons over 1916 was 1,853,306. That the increase in production is steadily gaining and had been gaining during 1917 is indicated by the fact that the production of gasoline during the last six months of the year was much greater than during the first six months.

The total gasoline production during 1917 was 2,729,712,033 gallons, or on a basis of 355 working days, a daily production of 7,478,630 gallons. In 1916 the daily production was 5,625,357 gallons. The total increase of gasoline produced in 1917 as compared with 1916 was 2,058,880,596 gallons.

While the production of gasoline was increasing 22 per cent. the production of kerosene increased but 7½ per cent. The total quantity of kerosene produced in 1917 was 1,566,015,103 gallons, as compared with 1,455,495,732 gallons in 1916, a net increase of 110,519,731 gallons.

The condition of the crude oil situation throughout the country is indicated by a 22 per cent. gain in production during 1917. For the year the production was 301,319,318 barrels of 42 gallons each, as compared with 246,992,596 barrels in 1916, an increase of 54,326,727 barrels.



In an address on "Foreign Automobile Trade and the War," delivered by John N. Willys at the Fifth National Foreign Trade Convention, he gave the following concise facts showing the stupendous volume of exports of the motor car industry:

"During the last three calendar years the exports of motor vehicles have been as follows:

"1915—Commercial cars, 22,094; passenger cars, 41,864; total valuation, \$94,884,393.

"1916—Commercial cars, 18,921; passenger cars, 61,922; valuation, \$96,673,108.

"1917—Commercial, 14,347; passenger, 65,792; valuation, \$88,347,739.

"Adding automobile engines, tires and parts, the total exports of the industry last year amounted to more than \$140,000,000, which very nearly equaled the total exports of all railroad locomotives and cars, all electrical machinery and apparatus and all agricultural machinery combined."

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The employees of the Firestone Tire and Rubber Co., Akron, O., in doing their patriotic "bit" last year in their war gardens, made an average of 94 cents an hour. This fact was brought out in the accounts kept by the company to demonstrate the practical, as well as patriotic value of the war garden. The following table taken from the report shows how the gardens were checked:

Number of gardens assigned..	265
Number of hours worked.....	15,313
Average number of hours per garden	57
Number of weeks.....	23
Average hours per man per week	2 h. 29 m.
Value of products at retail prices	\$14,205.59
Total cost of seeds....	\$500.17
Labor, watchmen, plowing	2,390.17
Miscellaneous expenses	134.22
	<u>3,024.56</u>

Net value	\$11,181.03
Average value of products from each garden.....	53.60
Average amount per hour received by each gardener in value of products.....	.94

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Chipman Hanlon Rockwell, a Hodgdon, Me., auto dealer, born in Wilmot, N. B., Feb. 14, 1883, volunteered his auto and himself for service in France at the Bromfield street depot of the British-

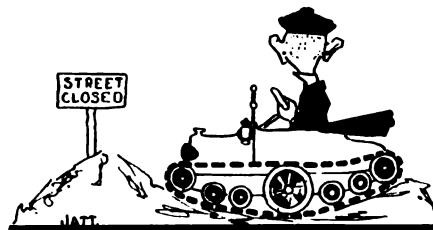
Canadian Recruiting Mission in Boston recently. Rockwell was accepted, but the offer of the machine was turned down because government regulations forbid its enlistment.

Rockwell said he had concluded it was the duty of every able-bodied man to give up everything and devote himself exclusively to war until "the Potsdam gang is put out of business." So he jumped into his car and came to Boston.

He passed the physical examinations and left last night for the infantry depot of the Canadian Army in St. John, N. B.

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The Ford chassis has been adapted to almost every form of moving vehicle from a passenger car to a tractor and now comes the "Ford Tank." It is not made by the Ford company, but is an adaption of the well known tank principle as developed by the British engin-



eers, only that it is a small replica of the machines that went over the German trenches, and operates with two men. It has the caterpillar type of running gear and can be maneuvered about with great facility, having greater speed than the large machines, as might be expected, carrying only a fraction as much weight.

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Notices are displayed in German machine shops giving hints on economy in lubricants which should be valuable in any country. These are:

Use only closed oil cans with spouts that will deliver drops or at most only a thin stream.

Use all lubricating apparatus strictly according to the instructions and put the oil only where it will actually lubricate. If a machine has automatic droppers, shut off the supply while the machine is standing.

Do not use cylinder oil on shafting or elsewhere when cheaper oil will answer. Keep all rubbing surfaces in good condition; rough surfaces and too tight boxes consume more oil; worn and leaky bearings waste oil.

Always use drip pans and arrange to filter and cleanse the oil so caught; it is

as good as new.

Collect all greasy waste and wiping cloths, so that the oil may be recovered; never burn them.

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The proprietor of a Seattle automobile company having some difficulty in getting a suitable stenographer as a last resort put the following want ad in one of the local newspapers:

Wanted—First class, high grade stenographer, must get it as fast as I can dictate, and get it right; must be absolutely accurate; must have human intelligence; if you are not a crackerjack, don't bother us.

This is one of the replies received in the mail the following morning:

"I note your requirements, as aired in the newspaper, and hasten to make inquiry as to this strenuous business that takes such an extraordinary stenographer. Your advertisement appeals to me strongly—stronger than prepared mustard, as I have searched Europe, Airopo and Irope and the states in quest of some one who could use my talents to the best advantage.

"When it comes to this chin music proposition, I have never found a man, woman or dictaphone who could get to first base with me, either fancy or catch-as-catch-can. I write shorthand so fast that I have a specially prepared pencil with platinum point and a water-cooling equipment that I have had constructed at an exorbitant expense, a note pad made of asbestos composition, covered with human hide, ruled with sulphuric acid and stitched with catgut.

"I use the A-W ignition, double unit exclusively and will guarantee to deliver my rated horse power under either the A. L. A. M. or S. A. E. standard. I have been passed by the national board of censorship and am guaranteed under the pure food and drug act of June 30, 1916. I can run with cutout open at all speeds and am in fact a guaranteed double copper, riveted, seamless, hand-buffed, hydraulically welded, drop-forged and oil-tempered specimen of human lightning on a 45-frame ground to one-thousandth of an inch. At hot air juggling you have nothing on me.

"If you wish to avail yourself of the opportunity of a lifetime, wire me, but unless you are fully prepared to pay the tariff for such service, don't bother me, as I am so nervous that I cannot stand to have my dressmaker measure my clothes. Spare your time and money unless you want to pay at least \$7 per week, in cash or in its equivalent.

"Louise Gethere."

Boston Trade Took Over \$500,000 New Bonds

**Successful Campaign Was Carried Out
Despite Depletion in Ranks of
Workers by Draft.**

The Boston trade put the Liberty Loan over the top, the campaign committee selling approximately \$500,000 of the Third Liberty Loan. George B. Kimball, who was a head of the committee of motor car and accessory dealers who handled the campaign, made the following statement at the conclusion of the work:

"For this time the men who went out canvassing were requested to confine their efforts to the trade.

"Therefore, they worked practically within the city. But they all put a lot of energy into the drive and when the final figures are made up it will show that at least \$500,000 worth of bonds were sold here.

"It must be remembered that since the last loan a great many of the workers have been drafted and this has depleted the forces of the trade here by several hundred. And on the second loan we went through with a rush and ran it into the millions.

"The managers of the Liberty Loan Committee are very well pleased at what we have accomplished, and I want to thank, through the press, all the men who have worked on the committee with me and in various ways have helped us put the figures up where they are."

DENVER ASSOCIATION RAISES QUARTER OF A MILLION.

A total of \$217,350 was brought in by the Liberty Loan Committee of the Denver Automobile Trade Association out of a total subscription of \$10,095,800 in that city. Hundreds of Denver Motor Club members participated in the campaign and also many prominent motor tradesmen outside of the association's committee.

PHILADELPHIA TRADE IN THE "MARCH OF DEMOCRACY."

In the "March of Democracy" in Philadelphia to boost the Third Liberty Loan, the automobile trade was well represented. E. J. Berlet, president of the newly formed Stability Motors Co., distributor for Atlas, Atterbury and Old Reliable trucks, United Haulage tractors and trailers, was director general and grand marshal; Lee J. Eastman of the Packard Motor Car Co. was chairman of the committee on decorations, while the vice chairmen were John D. Howley of the White Motor Truck Co. and A. E. Maltby of the Winton Motor Car Co., and president of the Philadelphia Automobile Trade Association. Associated on this committee were: C. R. Cunliffe of the

Cadillac Sales Co., E. H. Fitch of the Goodrich Tire Co., J. E. Gomery of the Gomery, Schwartz Co., W. S. Kip of the Buick Motor Car Co., A. S. LaRoche of the Velle Motor Co., W. Ross Walton of the Firestone Co. and Edward Wilkie of the Buick Used Car Co.

OVER 250 CHICAGO CONCERNS MAKE SHOWING OF 100 PER CENT.

Over 250 concerns made a showing of 100 per cent. or better in the Chicago trade during the campaign on the Third Liberty Loan. A subscription of 100 per cent. indicates that not only every employee has bought a Liberty Bond, but that a large amount has been sold to outsiders.

The Zinke Co. heads the list of motor car concerns with 300 per cent., while 22 manufacturers have showings of 100 per cent. or better, including the following: Stewart-Warner Speedometer Corpora-

Fisk Liberty Loan Campaign Was Big Success

**Quota of \$250,000 Oversubscribed in 42
Hours. Total of \$304,100
Sold.**

A five-day Third Liberty Loan Drive, with a quota of \$250,000 as the objective, was conducted at the plant of the Fisk Rubber Co., Chicopee Falls, Mass. The quota was oversubscribed 42 hours after the campaign started and the subscription at the close of the campaign showed a total of \$304,100.

The plant was divided into 10 divisions with a commander at the head of each division, assisted by captains and lieutenants. Each division was assigned a



The Big Score Board at the Plant of the Fisk Rubber Co., Chicopee Falls, Mass. Which Was Used to Record Progress of Liberty Loan Campaign.

tion, Vesta Accumulator Co., International Harvester Co., Elgin Motor Car Corporation, Van Coal Oil System, Fowler Lamp and Manufacturing Co., Commercial Truckmobile Co., Van Cleef Brothers, Kero-Karburetor Co., Hill Pump Valve Co., Johnson Automobile Lock Co. and Buell Manufacturing Co. The Stromberg Motor Devices Co., Findeisen & Kropf, Diamond T. Motor Car Co., Parrett Tractor Co. and Perry Auto Lock Co. are also well up in percentage.

INTERNATIONAL MOTOR EMPLOYEES GET \$125,000.

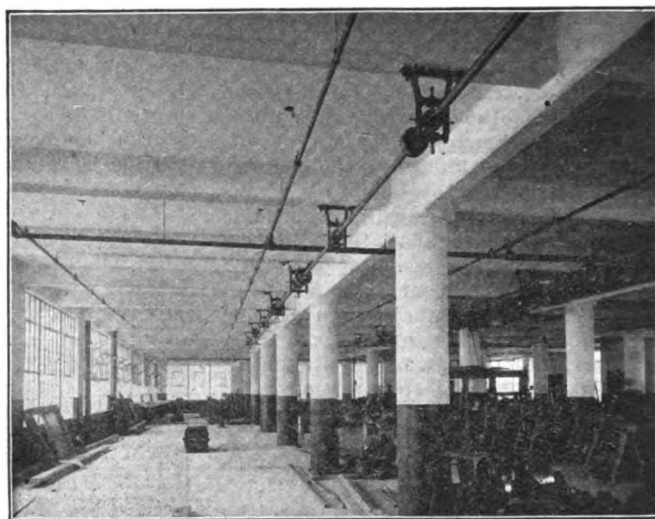
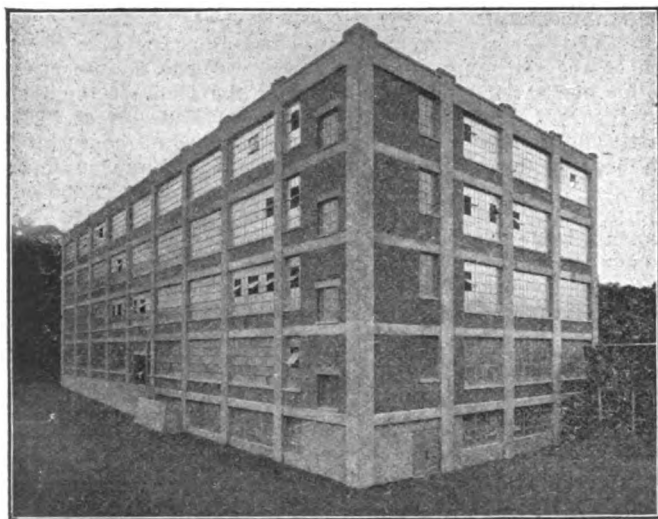
Employees of the International Motor Co. have subscribed to more than \$125,000 to the Third Liberty Loan. The company permits the workers to take out bonds in denominations of from \$50 to \$500, paying 10 per cent. a month.

quota based on the number of employees in their divisions.

The campaign started with a dinner in the administration building dining room, which was attended by the commanders, captains, lieutenants and invited guests. Addresses were made by officials of the company and several local men, including an address in Polish. Entertainment was furnished by the Fisk quartet and the Shubert Male Quartet. Enthusiasm prevailed at the dinner and it was predicted that the quota of \$250,000 would be oversubscribed with a rush. After the dinner the commanders of each division got their officers together and a canvas of the night shift started. So willing were the Fiskers to subscribe that 42 hours after the campaign started the quota was obtained, but the campaign continued on, ending with a total subscription of \$304,100.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration



Exterior and Interior View of the New Plant of the Jones Speedometer Co. at New Rochelle, N. Y., Provides Approximately 65,000 Feet of Floor Space.

The Jones Speedometer Co., New Rochelle, N. Y., has added additional manufacturing facilities to the plant. The new structure contains four stories and basement, being 76 feet wide and 170 feet long, ceilings 13 feet high. The building is of solid reinforced concrete with brick facing. Fenestra steel sash windows are used on about 60 per cent. of the wall area, giving ample light for manufacturing purposes. Stairways are provided at each corner of the building, built in with fireproof wall so that outside fires escapes are unnecessary. The John W. Ferguson Co. were the building contractors.

The Jackson Munitions Corporation, Jackson, Mich., has received an order for machining 1,000,000 75 mm. high explosive Mark L. shells and 177,500 155 mm. high explosive shells from the government. The work on the 155s has started and the work on the 75s will be started within a few weeks and will be handled by the Jackson Automobile Co., Jackson Cushion Spring Co., Sparks-Withington Co. and the shell division of the Mott Wheel Works, all of which concerns are acting as sub contractors.

The Maxwell Motor Co. has bought the business of the Harry Newman-Stratton Co., Chicago, distributors of Maxwell and Chalmers cars in that territory. The Maxwell company will operate the agency with A. J. Banta as branch manager. Mr. Banta is well known in the motor car trade, having at different times held the following positions: Assistant sales director of Chalmers Co., vice president of the Premier Motor Corporation and manager of Chicago branch of the Locomobile Co. of America.

The Parrish-Bingham Co., Cleveland,

O., manufacturers of pressed steel frames, are building a new plant for hardening and pickling steel. It is 120x144 feet.

The Standard Parts Co., Cleveland, O., has declared a regular quarterly dividend of $1\frac{1}{2}$ per cent. on the common stock, payable May 15 to stock of record April 30.

The Willys-Overland Co., Toledo, O., will increase its working force from 12,000 to 15,000 men immediately to handle the additional munitions and war work that the company is now prepared to handle. The installation of special machinery has been going on for some time and various departments reorganized to handle the government contracts, which are said to total \$27,000,000. The company is at present manufacturing about 500 automobiles a day and has unfilled orders on hand for 18,000.

The United Motors Corporation will absorb the Perlman Rim Corporation and will operate it as a division after the sale of the property and assets have been approved by the stockholders at a special meeting called for the purpose and which will be held on May 13. This action, however, will be of a formal character, as the Perlman Rim Corporation is already controlled by the United Motors Corporation and has been operated as a subsidiary.

The Stewart-Warner Speedometer Corporation, Chicago, Ill., has declared a regular quarterly dividend of $1\frac{1}{2}$ per cent. on the common stock, payable on May 15 to those of record on April 30. The company's net earnings for the first quarter of this year were \$213,282.

The Fulton Sales Co., Chicago, which handles the products of the American

Machine Products Co., has moved its offices further along Michigan avenue to the Grant Park building.

The United States Light and Heat Corporation, Niagara Falls, N. Y., is sending out to their dealers and service stations the first issue of a house organ. The publication has not been named as yet, a prize of \$15 being offered for the best title.

The Fisk Rubber Co., Chicopee Falls, Mass., and its subsidiary, the Federal Rubber Co., Milwaukee, did 33 per cent. more business during March, 1918, than in the same month last year. The two companies, it is estimated, will do a gross business of \$50,000,000 this year.

The Western Electric Co., New York, N. Y., is placing on the market a new farm lighting system, which with a 90 ampere-hour battery sells for \$325, and with 180 ampere-hour battery for \$385. Both prices are without the gasoline engine. The outfits have a 700 watt generator storage battery and a switch panel, 5x10 inches, incorporating an automatic regulating device. The switch panel is equipped with an ammeter and a single pole double throw switch for starting the engine and controlling the lights. All terminals are at the back of the panel. The regulator governs the charging current, supplying a tapering charge. It is planned later to market a 500-watt and 1050 watt outfit. Engines can also be supplied.

The Keystone Tire and Rubber Co. for March reports net earnings of \$71,288, compared with \$65,782 during January and February.

The Republic Motor Truck Co., Alma, Mich., for the nine months ending April 1, reports a production of 11,400 trucks,

or nearly 100 per cent. more than in the same period of 1917, when 5900 trucks were produced. The gross sales for the period ending April totaled \$12,000,000, as compared with \$6,000,000 in the same period last year.

The Willlys-Overland Co., Toledo, O., during March sent 2938 cars over the roads to dealers, as compared with 1000 driven away in that month last year.

The Ajax Rubber Co. during the first three months of the current year made net earnings of 77 per cent. in excess of those of the corresponding period last year and sales increased 72 per cent.

The Inter-State Motor Co., Muncie, Ind., which has ceased operations at its plant for some time, will soon resume work, but will discontinue the manufacture of the passenger car for the duration of the war. Production will be started on a line of one and 1½-ton trucks.

The Hal Motor Car Co., Cleveland, O., was recently sold at auction. Its inventoried value was \$200,000 and the items of stock included 10 finished cars, a considerable amount of accessories, machinery and furniture.

The New Era Spring and Specialty Co. has received an order for 1000 tire carriers to be installed on Dodge ambulances for use in foreign service.

The Sectional Tire and Rubber Co., recently organized, will locate at Muskegon Heights, Mich. The company will manufacture a tire invented by G. W. Kitterman.

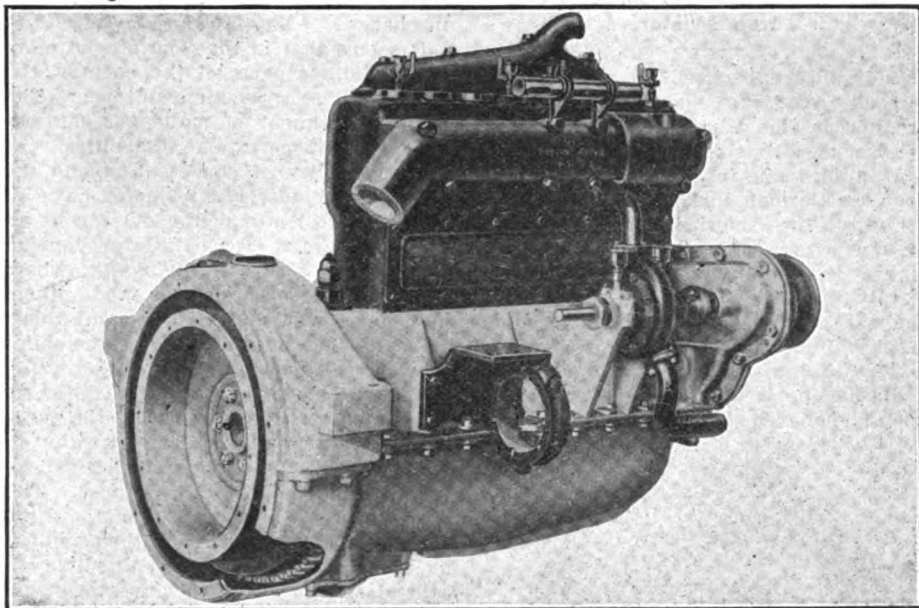
The Saxon Motor Car Corporation will advance the price of its six-cylinder touring model \$50, to \$1045. Manufacture of the four-cylinder model has been discontinued.

The Chalmers Motor Co. has increased the price on a number of the Chalmers models \$80. The new prices are as follows: Five-passenger roadster, \$1565; seven-passenger car, \$1615; coupelet, \$1775; sedan, \$1950; limousine, \$2925; limousine-landaulet, \$3025; town car, \$2925; town car landaulet, \$3025.

The Bosch Magneto Co., New York City, has sent out a letter to the trade stating that there is no occasion for concern regarding unfilled orders, as while the company will devote an increasing

proportion of its output to filling government orders, the production will be large enough to handle regular trade business as well. This announcement was made to allay any feeling of uneasiness in the trade occasioned by the fact that the Bosch plants at Plainfield, N. J., and at Springfield, Mass., were taken over by the Alien Property Custodian.

inches, the horsepower rating by the S. A. E. formula being 28.90. It has an extremely efficient system of lubrication. When the specifications for engines for government service were prepared the HU model, after several slight modifications in details that required no changes in essentials of design, was found to meet these fully, and contracts were sub-



Model HU Buda Engine, Which the United States Government Has Been Licensed to Build in Other Plants During the War.

The Great Lakes Rubber Co. has been organized with a capital of \$100,000 and will locate in Cudahy, a suburb of Milwaukee. The first unit of the new plant will provide about 45,000 square feet of floor space. Donald C. Barbee, general manager of the Badger Belt and Rubber Co., organized the company.

The Chief Motor Co., a Canadian corporation, capitalized at \$1,000,000, of which J. E. Erd and H. S. Erd of Saginaw, Mich., are the principal officials, has purchased the plant of the Monroe Motor Co. at Port Huron, Mich. The plant will be used for the manufacture of farm tractor engines.

The Buda Co., Harvey, Ill., which specializes the manufacture of engines designed for power trucks and tractors, but because of the very large demand for its product has been unable to take proffered contracts, has licensed the United States government to build its model HU engines, which have been adopted as a standard for the duration of the war for certain government installations, through outside manufacturers.

The model HU engine has cylinder bore of 4¼ inches and stroke of 5¼

inches, the horsepower rating by the S. A. E. formula being 28.90. It has an extremely efficient system of lubrication.

The Grant Motor Car Co. has declared the regular quarterly dividend of 1¼ per cent. on its preferred stock, payable May 1 to stock of record April 20.

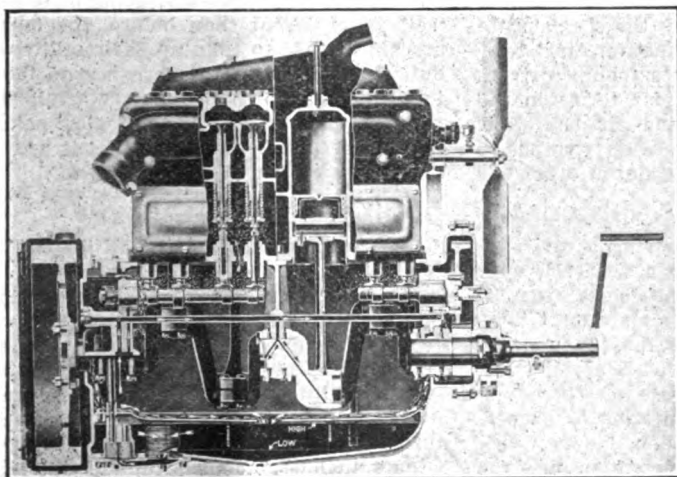
The A. E. Nelson Co., Detroit, Mich., makers of the Nelson car, will start shipments on its new cars as soon as the bodies arrive. The chassis have been completed and awaiting shipment.

The Cell-Beam Corporation, 510 Fifth avenue, New York City, will act as exclusive distributors for Cell-Beam spot lamp, made by the Cell-Beam Manufacturing Co., Brooklyn, N. Y. The officers of the new company are: President, Rex W. Wadman; vice president, Nicholas G. Rost; secretary, J. J. Record.

The Locomobile Co. of America, Bridgeport, Conn., will retire a part of its issue of 10-year sinking fund six per cent. gold bonds, bearing coupons maturing subsequent to June 1, 1918. The bonds are now held by the Banker's Trust Co., New York City.

Gaston Williams & Wigmore, Inc., have occupied their new building at 39 Broadway, New York City, which was recently erected to house the company's offices. The company is one of the largest exporting houses in the world and deals extensively in automobiles and products of the motor car industry.

The Vesta Accumulator Co., Detroit, Mich., has advanced the price on all batteries five per cent., which went into effect on May 10, and affects all shipments made on and after that date regardless of the date of the order.



Sectional View of a Model HU Buda Engine, Showing the Details of the Full Pressure Oiling System.

Eddie Rickenbacher Wins His First Air Victory

Foreign Dispatches Mention Famous Race Track Star as Conqueror of Hun Aviator.

Eddie Rickenbacher, the popular and famous American speedway pilot, is credited in the cables with having won his first aerial victory, having shot down a Hun birdman in a recent encounter over the German lines.

Few of the American drivers of fast motor cars enjoyed the popularity among the public and the racing fraternity that was held by Rickenbacher. He was always looked upon as a dangerous antagonist on the tracks, owing to his absolute fearlessness as a driver, and when he went abroad last year his friends believed he would not content



himself in the position of official driver for General Pershing, despite the honor it carried with it. In this belief they were vindicated, as it was not long after Rickenbacher had reached France that dispatches reported his enlistment in the American Flying Corps. Nothing further was heard of his activities for several months until the brief dispatch of his encounter with the Hun airman and the latter's defeat and death after a long race through the air at a faster speed than Rickenbacher ever attained on a Speedway.

There was no thronged grandstand to greet his victory, but it is pretty certain that he wore his characteristic smile when landing back at his own hangar.

HANDLING THE USED CAR IN SOUTHERN STATES.

Recently a fleet of motor trucks en route from the factory at Newark, N. J., to Richmond, Va., passed through Wilmington, Del., in charge of four young men, employees of a Richmond dealer.

On board three of the trucks were three used automobiles. This method of transporting new motor trucks presented no unusual spectacle as, since the railroads became congested with freight, it has been a common practise to deliver them to destination under their own power.

The character of the freight, however, caused a natural curiosity, which was satisfied by a talk with the young men in charge.

It seems that in the South, even more than in other parts of the country, the used car is at a premium this year. The large curtailment of passenger car production, transportation difficulties, the rational policy of conservation and the necessity of individual economy have all combined to continue the old car in active service and created a large demand for it, especially in the South, where large numbers of planters and others now have surplus funds to avail themselves of the convenience of automobiles they have long needed.

The Richmond young men, knowing conditions at home, purchased the three used cars in Newark. Transportation to Richmond cost nothing, as the trucks were available for the purpose. The young speculators intend to overhaul the cars, re-upholster and paint them and put on new tops and will undoubtedly reap a handsome profit on the investment.

Here is an idea which can be adopted by many car dealers to good advantage. With every consignment of trucks they can utilize haulage facilities, which would otherwise be wasted, to transport used cars from the large centres of population to smaller.

New Maryland Law Is Now Being Enforced

Number of Operators Sent to Jail and Very Heavy Fines Imposed for Violations.

Automobile Commissioner Baughman of Maryland is insisting on the enforcement of the new automobile law passed at the last session of the Legislature and which went into effect on April 1.

Recently three automobile drivers were sentenced to various terms in the House of Correction and six had their licenses revoked and fines of from \$20 to \$100 were imposed on a dozen other car operators.

Under this new law, which is now in effect, the offense of driving a car without knowledge of the owner, carries with it an imprisonment sentence of from 30 days to one year. A man caught driving a car while under the influence of liquor can be fined as much as \$100 and also placed in the House of Correction for a term. Reckless driving or exceeding the speed limit under this new law carries with it heavy penalties, and the commissioner says he proposes to see that this law is strictly enforced in every section of the state.

Women Employees in the Paige Plant

As Shortage of Help Calls for Adjustments Women Do Inspection Work.

An economic by-product of the war that is of unusual significance and interest is the introduction of female labor in the great motor car factories. Brought about by necessity and the urge of patriotism, competent observers have come to the conclusion that it is proving to be an excellent development from every viewpoint.

"We are now employing a goodly number of women in our factory," says Harry M. Jewett, president of the Paige-Detroit Motor Car Co. "This situation has, of course, been caused by the war. With thousands of men drafted into the army and the extraordinary demand made on man power for purely industrial purposes, there has developed in Detroit alone a shortage of skilled labor now estimated by our Board of Commerce statisticians at 20,000, and which they say will soon reach 33,000.

"This condition has necessitated a readjustment. It gives trained workers a greater opportunity and it has opened the way for new labor in positions where training and skill are not so greatly needed. As a matter of fact it was absolutely necessary to get additional labor if the work on government contracts was to be kept up to schedule and also if our ordinary industrial activity was to be maintained at a reasonable rate of speed. Consequently the employment of women in certain departments was a logical and natural development.

"At the Paige we are employing our women largely in inspection work, where they do not displace skilled mechanics, but yet find a congenial occupation which they are entirely competent to follow. In fact, in this line of work they are especially efficient and, because of their temperament they are even more conscientious than men. The consequence is that the work is being done as well as or better than before, the men are able either to take up their military duties or move up to more responsible jobs and the wheels of industry are kept running. It seems to be the logical solution of the problem and one that is proving advantageous to all concerned."

MILWAUKEE DEALERS MAKE BIG LOAN SUBSCRIPTIONS.

The motor car, truck and parts group of the Milwaukee City Committee exceeded its quota in the Liberty Loan campaign. One of the largest subscribers in addition to those previously reported is the Wisconsin Motor Manufacturing Co., with a purchase of \$80,000. Others include: Jonas Automobile Co., \$10,000; Davis Manufacturing Co., \$15,000; Julius Andrae & Sons Co., \$12,500; Goodyear Rubber Co., \$15,000.

The Haynes "Light Twelve" Model 44

The 21st series of articles dealing with the overhaul of used cars. It is the purpose of these discussions to show that a used car has extensive service value, which can be greatly increased with but a slight outlay and the replacement of worn parts. The May 25th issue of the Automobile Journal will review all the overhaul articles to date.

Overhauling The Automobile

Though the Haynes has a 12-cylinder engine, all parts are extremely accessible and the overhaul of this car can be accomplished by one person. This article takes up the overhaul work systematically, beginning with the radiator and working back to the rear axle, but either the transmission or the rear axle can be detached separately and removed without disturbing the other units.

The radiator is of the cellular type, with a tank above and below, and may be cleaned out by the use of a saturated solution of common washing soda. This should be put in the radiator after it has been removed from the chassis and laid upon the work bench. After this solution has had a sufficient time to loosen the deposits it should be poured off. When the reassembly of the car is complete a new solution should be prepared and allowed to act while the engine is running, thus completely flushing and cleaning the cooling system. Care afterwards being taken to thoroughly pour running water throughout to insure the removal of this solution.

The water pump is of the centrifugal type and should require no adjustment but the tightening of all bolts and the replacing in the stuffing boxes of graphited wicking. Be careful not to set the stuffing boxes too snug as this will bind the shafting.

GRINDING THE VALVES.

In removing the cylinder heads the rocker arm shafts must be removed to give access to the nuts on the studs which hold the heads to the cylinder blocks. When the heads are removed the valves can be taken out of the head by taking out the valve spring and retainer. When reassembling, replace the valves, then the head upon the cylinder block, the gasket and the surfaces that it comes in contact with should be carefully cleaned to eliminate any possibility of leakage. A thin layer of white lead will aid in giving the gasket a leak proof surface.

A clearance of .004 of an inch is necessary to adjust the rocker arms and this must be given when the tappet is on the heel of the cam. The valve timing is: Inlet valve opens five degrees after top centre and closes 34½ degrees after bottom centre. The exhaust valve opens 47 degrees before bottom centre and closes two degrees after top centre on the flywheel of 12¼ inches diameter. The flywheel is marked for 1-6 and 7-12 upper and lower dead centre.

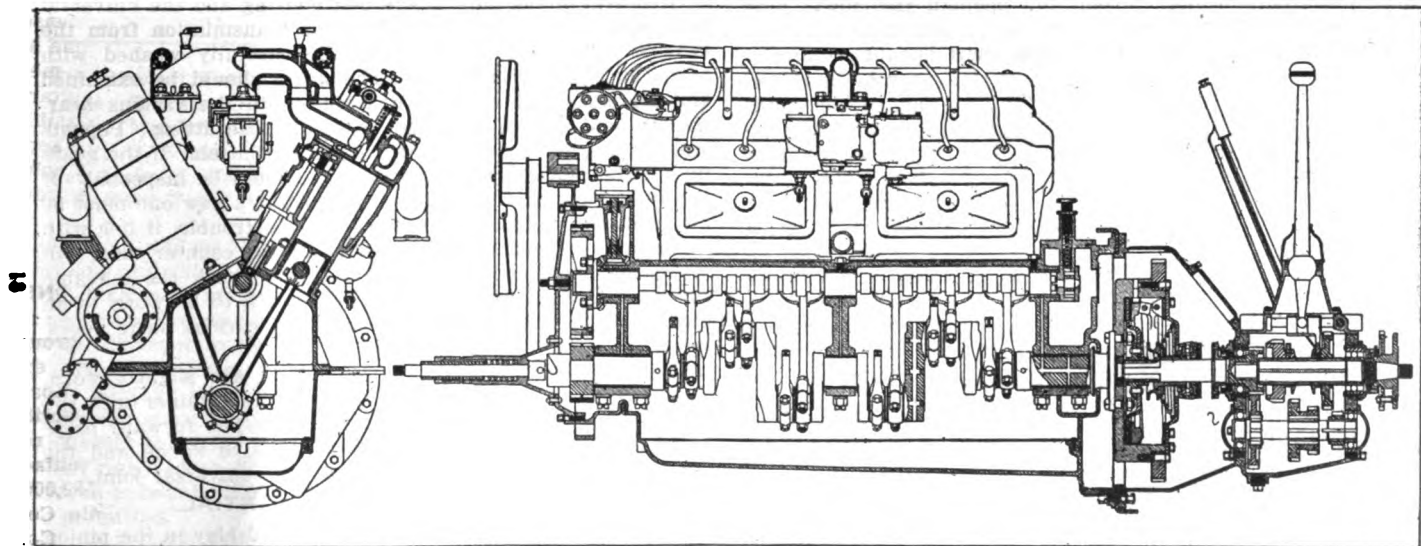
The crank case is split horizontally along the centre line of the main bearings and this arrangement permits inspection and adjustment of the main bearings. The crank case should be removed and thoroughly washed in kerosene to remove sediment that is deposited in the base.

The bearings are faced with babbit and are adjustable through the use of shims of various thickness. If the connecting rod bearings are worn they should be scraped and tested by the conventional method.

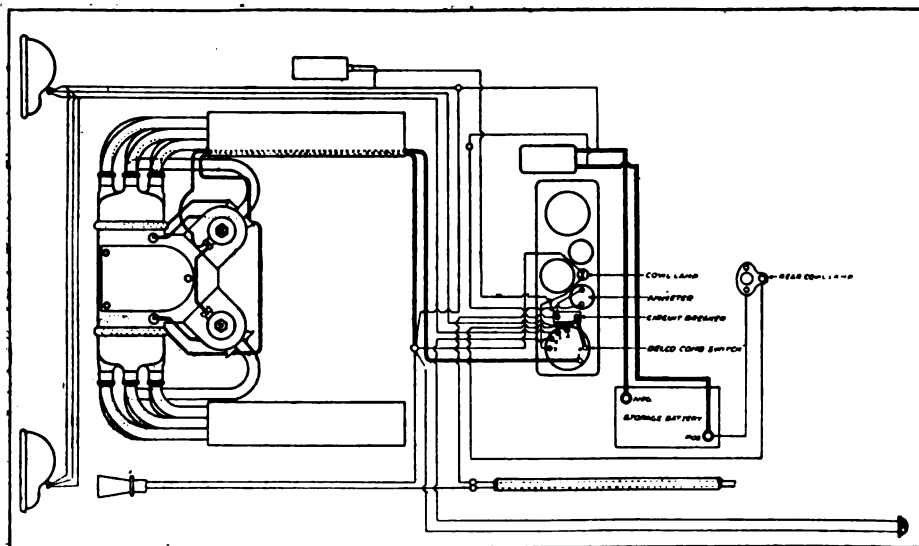
PISTONS.

The pistons carry four Burd leak proof rings each. Below the skirt ring is cut a groove into which the surplus oil is collected. Should the pistons need removing the connecting rod bearing cap is taken off and the piston pulled down from the cylinder. The number of the cylinder should be stamped on the rod at the lower end, near one of the bearing bolts. The rings should be carefully examined and replaced with new ones if found to be defective. In replacing the piston this mark must be placed on the right side of the engine, or the head of the pinch bolt at the upper end must be towards the centre of the engine.

Remove the chain case cover and take off the drive chain. Remove all the tappets or they will catch on the cams as they pass, then fall into the case after the shaft is removed. On replacing the camshaft and assembly the lateral motion is taken up by means of the cap screws, the thrust screw being drawn up snug against the end of the camshaft and



The Longitudinal and Transverse Sections of the Haynes Engine, Also Clutch and Transmission.



Wiring Diagram of Haynes "Twelve."

then backed off one-sixth of one revolution and locked.

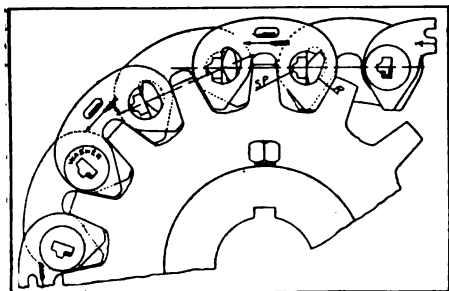
After replacement of the chain it is necessary to take up the slack, which can be accomplished by loosening the three screws that hold the water pump in place and remove the lock screw. Then with a punch rotate the bushing in such a direction that the slack is from $\frac{1}{2}$ to $\frac{3}{8}$ inch. When this adjustment is reached the bushing must be locked by the end of the screw entering one of the holes and clamped by the water pump flange screws.

If the chain is worn so that the proper adjustments cannot be obtained an "offset" link can be removed from it, thus making the chain one-half inch shorter. The chain must be taken from the gears and laid upon the bench. Every joint in the chain has two pins. A seat pin (SP) which has a rib that points in the direction of rotation and a rocker pin (R). When the "offset" link is removed drive a round pointed drift pin into the ends of the links to align them. Then follow this drift pin with the seat pin and rocker pin. Be sure that these pins are properly placed or it will cause a knock on the small sprocket which will in time destroy the chain.

THE DRY DISC CLUTCH.

Removal of the drive and pedal shafts and the cap screws will permit dropping the transmission case, thus giving access to the interior mechanism of the clutch. Two pieces of wood about one inch thick are inserted under the projecting lugs that fit into the shifting yoke. It is essential that to be sure that the wooden blocks are squarely under the lugs. After this has been accomplished the clutch cover plate can be removed by taking out the cap screws.

Draw out the clutch thrust ring and take off the top plate of the clutch housing. From this opening the dowel pins which fit into the notch cut in the thrust ring may be driven out with a drift punch. The crank shaft should be turned



The Morse Chain, Showing, S. P., Seat Pin; R, Rocker Arm; W, Washer.

gasoline and carefully inspected for wear and they should be replaced by new ones if worn.

The inner ring may then be inserted, followed by the friction ring, which must be set so as to be free to move on the shaft. The outer ring is then replaced and the dowel pins fastened. Next comes the thrust ring, which, too, must be

These parts should be carefully washed in

gasoline and carefully inspected for wear and they should be replaced by new ones if worn.

perfectly free to move forward and backward. If the movement is not free, adjust the dowel pins so that the desired motion may be obtained.

Examine the clutch cover until "X" is found, as this mark will indicate that the holes nearest it are spaced closer together than any of the others. Locate the two closest holes on the flange of the flywheel and insert the cap screws. Be careful to see that the clutch bell crank rollers are so turned that the flat side is against the thrust ring. Remove the two wood blocks and raise the transmission and insert the clutch shaft.

Some difficulty may be experienced in getting this unit in place, but with forethought to the work it may be accomplished in a short time. With the aid of a pinch bar force the lugs of the shipper collar into the correct position in the clutch and throw out the yoke. Then with one end of the pinch bar on the flywheel and extending through the opening in the clutch housing, pull up slightly and the parts will slip into position. As the bell crank levers are at thirds and the adjustment screws at halves, a half turn from the correct position will render impossible the correct adjustment of the clutch.

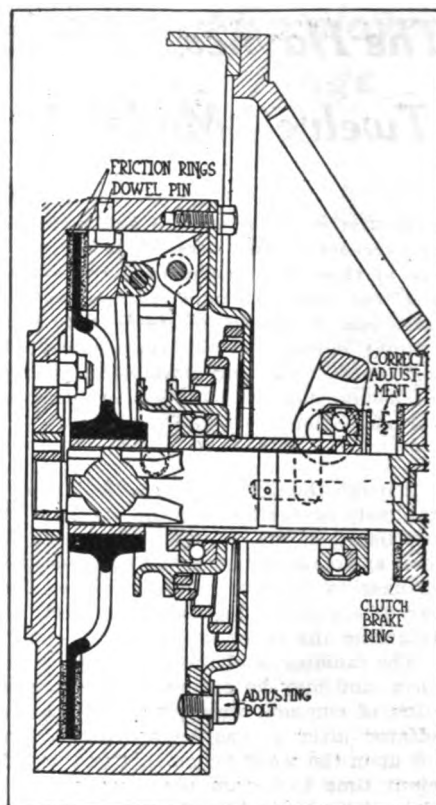
TRANSMISSION.

Removal of the nuts in the bell housing and the universal joint will permit the removal of the transmission from the chassis. This assembly should be carefully washed with kerosene and a stiff brush. The gears should be examined and all parts tightened with attention to the various bearings to note that they are not worn or loose fitting. Poppets and springs are used to hold the gears in mesh. If the gears fly out the poppets and their springs should be inspected. If the spring does not give sufficient tension, a new one must be inserted, and if this does not remedy the trouble, it lies with the gears. A loose or worn bearing on the counter shaft will allow the shaft to chatter and this will work the movable gear out of mesh, allowing the gear teeth to be worn to an angle and later making replacements of various parts necessary.

Replace the felt washers, as if these are slightly worn, they will allow the oil to go through the retainer into the ends of the bearings on the main shaft. The forward packing nut is located behind the clutch brake flange and the rear one in the companion flange on the universal joint.

ADJUSTMENT OF DIFFERENTIAL.

If inspection of the rear axle shows end play in the pinion shaft it should be taken up by the inner adjusting nut back of the rear universal joint. This nut is used to lock the outer

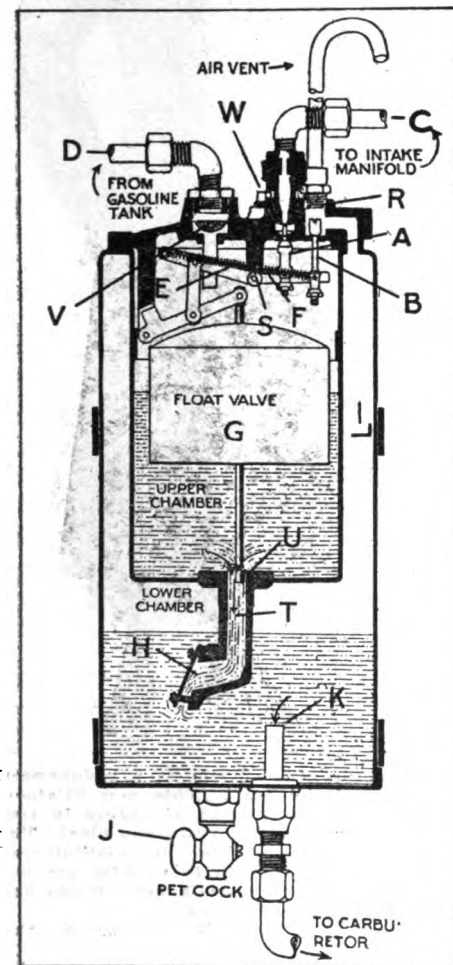


Sectional View of the Borg and Beck Clutch.

race of the shaft bearing in the adapter. A small set screw will be found in one of the wider notches on the bearing adapter or adjusting collar. This is to lock the adapter nut into place. The collar locks the inner race of the bearing to the shaft and is fastened to the shaft by means of a wire lock, an end of which passes through the small hole in the collar and into slots in the shaft. Upon inspection of the differential bearings the oil must be removed from the case, which can be accomplished by taking out the plug in the bottom. When this is done the rear cover plate can be removed and this will give access to the differential ring gear and bearings. If there is any motion present it may now be taken up by means of the bearing adapter. First loosen the nuts that hold the bearing straps and remove the lock screw.

Then the bearing adapter is turned so as to force bearing towards the differential. This will take up the lost motion. It is essential to see that the back faces of the ring and pinion gear are flush. The teeth should have a clearance of

.006 to .008 of an inch. If it is necessary to change the position of the pinion the outer nut behind the rear universal joint is used. The pinch bolt must be loosened and the lock removed. The adapter is right hand threaded so that the pinion can be shifted in or out. In changing the location of the ring gear the four nuts that hold the two straps over the bearing must be loosened, but not enough to allow the threads of the adapter to be stripped. The lock screws must be removed from the straps before the position of the adapters can be changed. The adjustment of the pinion and ring gears must be manipulated together until the gear edges are flush and the desired clearance is obtained. Care must be taken to tighten all



The Stewart Vacuum Tank: A, Suction Valve; B, Atmospheric Valve; C, Pipe to Intake Manifold; D, Pipe to Gasoline Tank; G, Float; H, Flapper Valve; J, Pet Cock; K, Connection to Carburetor; R, Vent Tube; V, Screen; W, Plug.

nuts and replace the locks. The rear wheels may be jacked up and the axle adjusted and tested for quiet operation with the high gear in mesh and the engine running. After this inspection the rear cover may be replaced and the axle filled with lubricant to the level of the filling hole.

The differential and pinion shaft may be removed as a unit so that adjustment and inspection can be carried on upon the work bench. These are carried on the front cover and after the drive shafts have been taken out, the propeller shaft removed at the rear universal joint and the brake tubes moved outward an inch or so, the removal of the front cover is permitted.

TIRE ROD AND STEERING KNUCKLES.

The proper alignment of the tires is very important and

this can be accomplished by jacking up the front axle until the wheels revolve free of the floor. With a piece of chalk mark the tires of each wheel on the inside placed in a horizontal line with the hubs. Measure the distance between the rims of the wheels at the chalk marks with a stick or rod. Then turn the wheels a half revolution and measure again. The difference of the two measurements should be 5/16 inch, with the shorter measurement being in front. If it is necessary to change this alignment the left steering arm yoke pin is removed and the yoke changed in its position on the rod after the pinch bolt has been loosened. Turn the yoke to the left to lengthen the tie rod and make the wheels toe in.

When removing the steering knuckle take off the nut on the bottom of the king pin and drive it out. The pin in the tie rod yoke must be removed and then the knuckle is free from the axle. The steering knuckle has two bronze bushings to carry the wear. There are two thrust washers, one bronze and one steel, covered by a dust washer at the top end of the knuckle. This assembly should be carefully washed, lubricated and assembled with the bronze washer placed on first and then the steel one.

REAR WHEEL BEARINGS.

The bearings in the rear wheels of all Haynes cars are Gurney duplex. Two individual bearings are placed together to make one complete bearing in each wheel. The outer races are clamped together in the wheel hub by the driving flange bolting against them. A felt washer carried by a retainer is placed between the flange on the axle and the bearing adapter. The inner races are held in place by two locking nuts. The two nuts press the centre races of the bearings together. If the bearings are removed, care should be taken to return them in the proper relation to one another. In greasing the wheel bearings the driving flanges must be taken off by removing the six nuts around the hub flange. The hub and attached flange may then be pulled out and the lubricant placed in the bearings. It is not necessary to remove the wheels unless the inspection of the brakes is desired. If there is difficulty in getting off the flange, drive a small metal wedge behind the flange in the slots provided for this purpose.

STEERING GEAR.

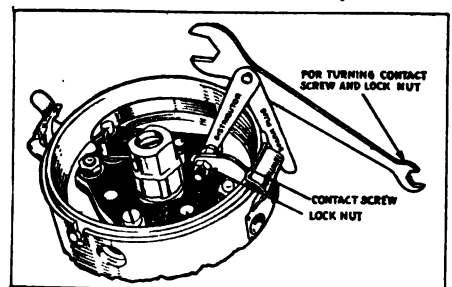
The Haynes steering gear is semi-reversible and is adjustable to all wear by one adjustment only. After inspection of the different units the excessive back lash can be taken up by loosening the cap screw and screwing down the adjusting nut, which turns to the right. The adjusting nut is screwed down on the thrust bearing, which forces down the screws and the sliding half nuts against the yoke rollers. The pitman arm is fastened to the yoke shaft. It is not necessary to take the steering gear apart, only as a last resort, but if this should be necessary care should be taken in reassembling to place the half nuts in the proper position. All the gears should be filled with a heavy grease thinned with a little engine oil.

THE RAYFIELD CARBURETOR.

If the mixture is too rich on high speed with the adjustment to the lean side of cam, it will be necessary to disassemble the carburetor and replace the metering pin with a smaller size. If the mixture is too light a larger size is necessary.

It is best to work at a clean bench, as this does away with the chance of dirt being caught in the various parts.

Take off the pot dash cover of the carburetor, care being taken not to loosen the gasket. Remove the cotter pin at the top of the air valve cone. Push this cone all the way down and with a punch small enough to pass through the cone, push the piston stem through the cone. This must be done carefully to see that the piston or metering pin does not drop



View of Interior of Distributor.

(Continued on Page 48.)

Auto Apparel Appropriate for Spring

Light Textures and Colors Now The Fashion



New model "Palmer Garment" motor coat of burella cloth in Sammy, olivesage, tau green and all the smart new shades. Collar is convertible and may be buttoned closely around the throat. Novelty pockets, back and belt are trimmed with self-covered buttons. Waist and sleeves are lined with fancy silk.

(Courtesy Percival B. Palmer & Co., Chicago, Ill.)

By MRS. A. SHERMAN HITCHCOCK.

NOW is the time when town life palls and the longing to get out into the country, to revel in the early blossoms of fruit trees and shrubbery is intense. The fruit trees are big bouquets of pink and white blossoms and the lawns are gayly decorated with bushes of yellow and white bloom. All the roads are through picturesque scenery now. Fortunate is the motorist who can follow inclination, and at a moment's notice tour away through scenes of nature lure, where the delights of outdoor life and the beneficial results of fresh air and sunshine work wonders in the way of repairing the ravages of the winter.

The real secret of the motor woman's good dressing is to always have the proper clothes for the occasion. This does not necessitate having a large num-

ber of garments, but rather that there must be a fine discrimination in the choice of them. It is frequently the case that the woman having the largest wardrobe is not well dressed, while another who has considerably less will unfailingly make a good appearance. "Enough is as good as a feast" is a very wise motto which is appropriate to a variety of occasions, but never more appropriate than when it is applied to a woman's wardrobe. This season the materials used in the motor clothes are many and varied, in spite of the fact that we are Hooverizing on wool. There is no restriction on cotton, linen or silk, so there is still a great variety in these charming fabrics for spring and summer wear. The silhouette in motor clothes is straight and box like, rather than tight, and the colors are bright as a rule.

In selecting one's motor garments it is not difficult to choose a practical and smart outfit if the subject is given some thought. There are many charming little frocks, simple in design, but decidedly modish, that are admirably adapted for the motor woman's wear beneath the coat. A light weight serge, a mohair, tricotine, jersey or any of the rough silks are materials most effective for motoring costumes. Dark blue is a color that always appears well and even on the warmest days it seems cool. The browns, grays and greens are also desirable. An effective motor dress of blue serge has a skirt made with a loose front and back panel, both trimmed with bands of black silk braid and at the bottom the bands cross; the side panels are box pleated. The waist has a broad vest of tan crepe which crosses in surplice fashion, and the back is braided and has bretelles passing over the shoulders. The waistline is raised and the skirt section finishes in a narrow ruffle over the waistline, which is defined with a narrow braid; the sleeves are short and have undercuffs of the crepe. The sleeves and panels are finished on the bottoms with braid loops.

A smart model designed for motoring wear is of sand jersey and is buttoned in the back. It is in one-piece, the straight skirt is cut with a bib which reaches to the bustline on the front; the bib rounds at the hipline and is opened, serving as pockets. The neck is wide and round and trimmed with a narrow pleated white crepe band edged with coral colored taffeta. The sleeves are long and tight fitting and have the same trimming as the neck. All motor models are planned for an easy, simple and quick adjustment of fastenings, so that they may be slipped on and off with the least amount of trouble and time. This is



The motor coat of silk is a pronounced feature of the year. This new "Palmer Garment" coat is built of taffeta in tan, gray, Hague, green, brown and black. The convertible collar is of embroidered broadcloth. The novelty pockets are finished with stitching, silk arrowheads and buttons.

(Courtesy Percival B. Palmer & Co., Chicago, Ill.)

particularly true of models intended more for touring than ordinary wear in the car. The dress fills a vital need of the motoring woman and it should be chic and simple.

If a modest size is adhered to the black and white checks will make up into fetching little motor dresses. There are some very attractive patterns in these checks in the Nu Vogue fabrics, and the many excellent features of this material renders it particularly adaptable for motor wear. It is quite inexpensive, very durable and comes in a wide variety of various size checks and plaids, not only in black and white, but also in the season's smart colors. It is a cotton fabric, but is an exact weave of the expensive wool materials and is wonderfully attractive. It gives great satisfaction and is in excellent taste. There



For motoring about the city or to smart little affairs nothing can exceed this hat for smart style or becomingness. It is of a simplicity and elegance that appeals strongly to the woman of discrimination. It is named the "Irene" and is made of Hsere, hand sewn and has a satin crown. The ornament is a handsome quill of crystal and jet.

(Courtesy Gage Brothers & Co., Chicago, Ill.)

are some large plaids which develop splendidly in both one-piece dresses and the separate skirt, without which the wardrobe of the motorist is incomplete. This is a year of plaids and checks. Never have they been more popular or more lovely. Another material which cannot be recommended too strongly for motoring wear is the Devonshire Cloth. It is one of those materials of which you can say in perfect truth that it will not wear out. It tubs beautifully and always presents the same new and attractive appearance. For the woman who drives or spends much time in her car no material could present more ideal possibilities than Devonshire Cloth. It is to be preferred to linen for motoring use for many reasons. The woman who has tried one or two dresses of this fabric will, I am entirely confident, never be without them, and for the motorist who wishes to always be ready for a spin five or six dresses is not too many. For the motoring picnic it is the material par excellence. There is a wide assortment of attractive designs from which to make a choice. Stripes, plaids and plain effects in the most charming of colors.

Since the corset that is comfortable is an absolute necessity for wear in the car, designers have brought forth some very new and excellent models that are entirely practical from every point of view. A model especially designed for medium and heavy figures is proving a most successful garment. It is fairly low in the bust and long in the hips. The front steel is short and from the waistline up it is fastened by snappers. From

under the arm and extending to the front there is a triangular piece of elastic, the wide part being at the front. The gives ease and comfort and especially on long tours, giving one the opportunity of changing the position as frequently as desired with perfect comfort. There is also a motor corset for slender figures cut short in the skirt and low in the bust. An elastic inset over each hip gives freedom and some models have a rubber inset in the back which extends below the waistline. These models button up the front with four buttons.

There are two types of hats illustrated, one for touring purposes and the other for the more dressy motor occasions. The little leather hat is ideal for the



Here is a model quite ideal for the motor tour. This smart motor hat has a leather top and pongoe trimmings and an elastic back. The veil is of plain mesh, much liked by all motor women. It comes in color combinations of brown and tan, black and navy, black and green, black and taupe and black and rose.

(Courtesy Franklin Simon & Co., New York City.)

tour, but would be sadly out of place for many occasions where Milady goes by motor. There are some very chic little motor hats made entirely of ribbon and many motor women are buying the handsome ribbons shown this year and are making their own hats. It is really very easy to do and several may be made at about the same price that one would cost in the shops. One model is made entirely of brown cire ribbon about five inches wide; the soft crown is made of the plain ribbon, while the brim, which is rather narrow, is covered by the ribbon finely pleated. About five thicknesses of the pleating is used, which gives the effect of a ruching. Ribbons braided or laced together are another feature of motor hats, sometimes using the plain ribbon for the crown and the braided or laced for the brim, or vice versa. Ribbon may be knitted or crocheted and used for the entire hat and a trimming added of a rope made by twisting the ribbon together and placed about the crown base, ending in two little balls on one side. Also on the

idea of the laced or crocheted effect is a motor hat with the soft crown made of French blue ribbon shirred all around the crown to give something of a tam effect and the rolling brim made of vertical strips of the ribbon. A flange is simulated by the use of a horizontal lacing of the ribbon about an inch from the brim edge. Care should be exercised in selecting ribbon for use in these ways, as all ribbons will not manipulate readily and leaves a stiff and ungainly effect. There is really no better ribbon for knitting or crocheting purposes, or to be used in any way where a soft and rich effect is desired, than the Regatta ribbon. These ribbons come in all the smartest and most desired shades and are of a lovely quality and style.

The Shetland sweater illustrated is one of the very newest from the manufacturer and is one of the most attractive garments turned out this season. The pleated skirt is in contrasting colors and makes the garment very effective.



Every motorist can see at a glance why this excellent sweater of Shetland wool would be especially protective, as well as smart for her use. It has all the attributes most desired for motor wear. The pleated skirt section is entirely new this spring and well adapted to the charming color combinations in which this garment may be had. In buff and turquoise, purple and white and many other combinations, the garment is unusually attractive. (Courtesy Standard Knitting Co., Cleveland, O.)

The Kissel Four Passenger All Year Sedane'

*Latest Additions To Well
Known Line Have Many
Distinctive Features*

THE novel and striking body designs that have been created by the Kissel Motor Car Co., Hartford, Wis., have made that company's product stand out distinctly among the several hundred other motor cars manufactured in this country. This is particularly true of the four-passenger Sedane' and the seven-passenger staggered door touring-sedan, the latest additions to the Kissel line.

In the Sedane', which is on the "hundred point six chassis," the user is afforded the comfort of the sedan type of body with the utility and economy of the roadster. It is equipped with the latest Kissel "all-year top," which is entirely removable and a new feature is that all windows, excepting the rear one, can be

properly support the top. This lower body and the top are built at the same time, so that the two halves may exactly dovetail, allowing no visible fastenings or attachments, nothing to indicate that it is not one solid piece of coach building from roof to running boards.

doors are French plate glass of best quality and are so set into the top that leaks, draughts or rattles are impossible.

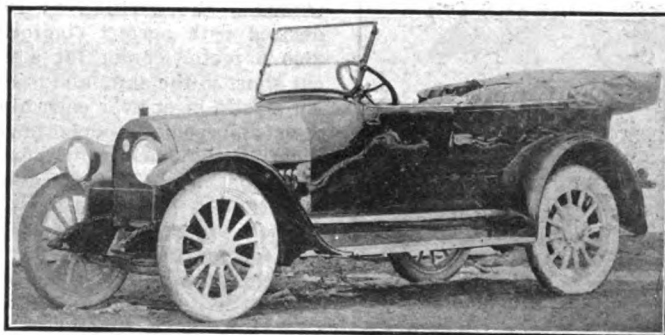
The body and top are joined at 10 points by means of rectangular bolts and sockets of which nothing remains in sight either outside or inside. A layer of felt and non-squeak material between the lower body and the top eliminates noise. As the halves are attached, spring plungers automatically connect the electric wiring. Ventilation is obtained through the double windshield and all windows excepting the rear one are adjustable at any height and drop down into the lower body their full length if desired.

Deep upholstery, resilient cushion springs, genuine leather of a very reliable grade and a tilt that fits the back, make the seats very comfortable.

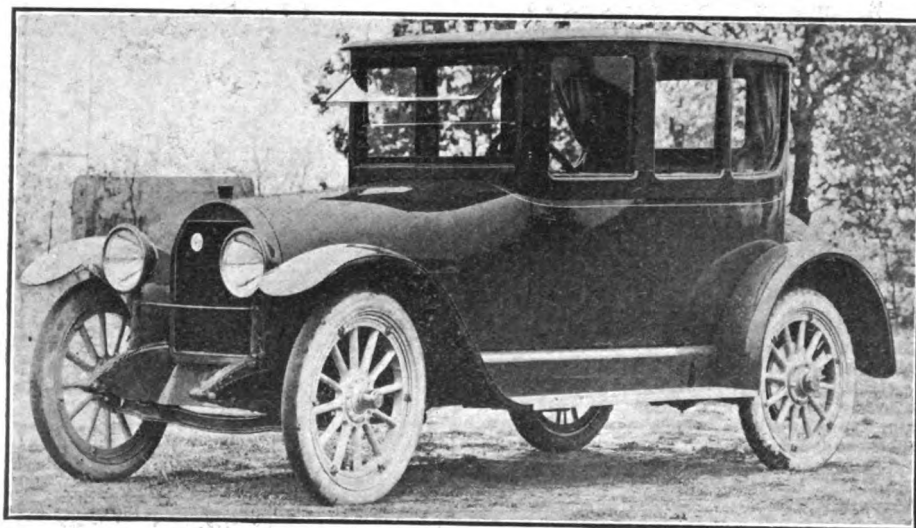
Both of the new models have 22 coats of body finish, eight more than are usual. The tonneau hangs low and gracefully, with ample clearance, due to an arch in the bow of the frame.

The sedan is available on the hundred point six chassis, with Kissel built power plant, axles and double external brakes.

The features that differentiate the new seven-passenger, staggered door touring-sedan model from the regular five-passenger sedan are the two doors instead of three, one on the left side by the driving wheel and the other on the right side, opening into the tonneau.



The Sedane' with Top Removed. Reflections on Body Indicate Deep Lustre Produced by 22 Coats of Finish.



The Kissel Four-Passenger All-Year Sedane' on the "Hundred Point Six" Chassis.

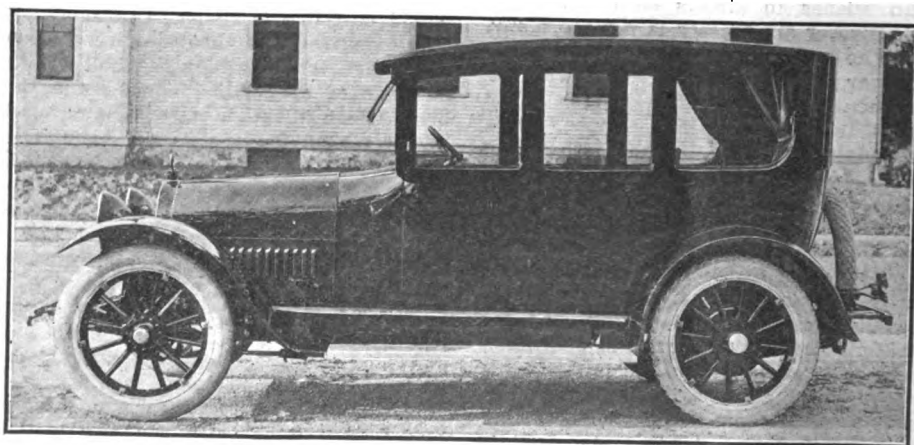
raised or lowered at will, making it a closed car in stormy weather, a semi-open car by lowering the windows, or an open touring car by removing the top. A new summer top in pantasote of Victoria style in the rear, one French beveled glass window on either side and two in the rear is another Kissel creation.

Appearance alone has not guided the Kissel designers in creating new body types, effort always being made toward securing increased comfort and in this direction also the Sedane' represents an improved type, having 16 inches of leg room in front and 15 inches in the rear.

The front seats are 16 inches wide, with a 10-inch aisle between. The rear seat measures 43½ inches wide and 19 inches deep. The doors on both sides are 24 inches wide. From floor of the tonneau to the top of the all-year top, measured four feet four inches on the inside.

The all-year top is built in to the staunchly built special body designed to

The frame and doors of the detachable top are of heavy selected white ash and elm rigidly joined and covered with silver finish sheet steel. The roof is three-ply paneled white wood under heavy laminated duck canvas. The win-



The Kissel Five-Passenger Staggered Door Sedan.

License Plates on Drive-Away Cars

Different States Recognize Duplicate Dealer's Plates, Which May Be Used Repeatedly.

Dealers who have had difficulties with local officials in various places over the movement of strings of cars in "drive-aways" from the factories, can avoid trouble over license plates by purchasing a sufficient number of duplicates of their dealer's license plates to attach to each car in the string and using these for each successive drive-away during the year.

In a letter to the National Automobile Chamber of Commerce, Francis M. Hugo, secretary of state for New York, writes:

"The motor vehicle law of this state does not authorize this office either to grant privileges (for running cars through the state under their own power) or to issue any transit tags. The proper way to do is to get out extra sets of dealers' plates enough to cover all shipments of cars to be used on the cars while going through the state. After the cars are delivered at their destination the plates can be shipped back to the manufacturer and used for the next lot.

"Most of the dealers have acquiesced in this suggestion and have found it very successful, and it would seem to me to meet the situation.

"If there is anything further I can do to relieve the situation I shall be only too glad to do it."

Under the reciprocity provisions of the different state laws these dealers' plates will be recognized and the strings of cars permitted to pass through. A fee of \$5 is charged for each set of duplicate plates for one car. Fifty sets probably would suffice for all drive-aways made by one dealer in the year.

The New York state law provides for the issuance of "such additional sets, not exceeding four, for which he (the manufacturer or dealer) shall have paid the fees provided . . . but the secretary of state may limit the total number of dealers' plates to be issued to any particular dealer in excess of five."

It is evidently not the intention of the secretary of state to take advantage of this limitation.

HEAVY OVER DEMAND FOR PASSENGER CARS.

"I have been searching everywhere for the fellow who said the automobile business was going to be slow this spring, but so far I have been unable to locate anyone who will now own up to the authorship of that statement," exclaimed F. H. Akers, sales manager of the Reo Motor Car Co., on his return from a visit to various Reo distributors

throughout the country.

"Our sales records show that business has opened up this year about two weeks earlier than usual; and that despite one of the most severe winters we have ever had. Orders are rolling in from everywhere and if we could make them and then ship them, this would be our banner year.

"Nor is this condition confined to the Reo product. In all fairness I must say that practically all reputable makers are enjoying the same demand for their product—in fact there is a general and a very heavy over demand.

"Of course prices are higher all the way along the line, but, on the other hand, everybody's earning capacity and profits are greater.

"Not only that, but the need is greater. Presumably nobody buys an automobile and especially at this time of year, for pleasure. Fully 99 per cent. of the purchases are made under the spur of necessity.

"In some cases perhaps buyers are simply protecting themselves against further advances in price which they realize must come; and others are trying to get in ahead of the spring rush. But in all cases the indications are that necessity is the principal incentive and that the demand is not confined to any one section of the country.

Regal Motor Car Co. Assets to Be Sold

The Creditors Decide to Offer the Plant For Sale at Public Auction.

At a meeting of the creditors of the Regal Motor Car Co., which was called by the Security Trust Co. of Detroit, it was decided to discontinue operations and sell the plant at public auction.

On Feb. 12 last the Security Trust Co., acting as receivers, took over the plant, and since that time has continued operations for repairs and parts, but no car production has been thought advisable. Assets of the plant as a going concern have been appraised at \$1,155,710.13, with liabilities of \$631,990, of which \$356,454 is secured by a trust mortgage.

BANKRUPTCY PETITION FILED.

An involuntary petition in bankruptcy has been filed against the Bour-Davis Motor Car Co. on behalf of Morton W. Smith & Co., Charles J. Bour and the Touzalin Agency.

A Generation Ago In Motordom



This is the first of a series of pictures taken from the files of the Automobile Journal Library, which will be published to link up the past with the present in an interesting and graphic way and to illustrate the remarkable strides made in the development of the motor car. The above picture, which was originally published in the Automobile Journal nearly 10 years ago, shows Dr. E. G. Reinert of Hartford, Conn., riding in his Columbia Electric, which he purchased in 1899. At the time the picture was first published the owner had traveled over 58,000 miles in the car.

Activities of Prominent Men and Other



H. J. Dettterich, Advertising Manager of Bearings Service Co., Detroit, Mich.

Edwin O. Wood, assistant to **W. C. Durant**, president of the General Motors Corporation and a director and treasurer of the Chevrolet Motor Co. of New York, died at Pasadena, Cal. Mr. Wood was the author of the history of "Michigan and the Northwest," and is the author of "Historic Mackinac" and "History of Genesee County," Michigan.

W. C. Freeman, Dallas, Tex., has been appointed manager for the Quick Tire Service. **F. E. Morris**, whom he succeeded, has been transferred to Tampa, Fla.

W. Ashley Gray, for 15 years prominent in the motor car business in St. Louis, has resigned from the Packard Missouri Motor Car Co. to take up insurance work.

Joseph O. Welker, St. Louis, Mo., has been made manager of the Gramm-Bernstein truck department of the Welling Motor Co., 5033 Delmar street.

J. V. Thomas has been promoted to the position of sales manager of the B. F. Stearns Co., Cleveland. For the past year he has been assistant sales manager.

R. S. Elliott has resigned as sales manager of the L. H. Rose-Chalmers Co., Chalmers distributor for Northern California. Previous to his connection with the Chalmers company he was sales manager for Don Lee, Pacific coast Cadillac distributor.

L. Charipar has resigned from the purchasing department of the King Motor Car Co., Detroit, Mich., to become associated with the C. R. Wilson Body Co. plant at Bay City, Mich.

Robert J. Brookes, formerly salesman for the Arcade Motor Co., Little Rock, Ark., has been elected vice president and sales manager of the Capitol City Motor Sales Co., which has new quarters at 214 Louisiana street.

Samuel A. Wherritt succeeds **William J. Mead** as manager of the Chicago branch of the Chevrolet Motor Co.

C. E. Baldwin has been added to the staff of the Dickerson-Lehmann Co. of Peoria, Ill. He was one of the original representatives of the Ford Motor Co., when Dickerson was conducting the Ford branch.

C. S. Orand has been selected as the new manager for the Keaton Tire and Rubber Co., Portland, Ore. He succeeds **J. G. Tormey**, who has gone to the service. For the past 15 years he has been in the automobile tire business in San Francisco and Los Angeles.

H. O. McGee has joined the sales force of the Eastman & Gale Motor Co., Indianapolis, distributor for the Dort car in Indiana, Kentucky and Tennessee. He will have the management of retail sales in the various states.

J. V. Toomer, former manager of the Hardin Motor Co., has joined the Carolina Machinery Co. of Sumter, S. C., distributors of the Columbia Six.

Jack Griffin has been appointed advertising manager for the Chevrolet Motor Co., California, with headquarters in Oakland. He has been in the publicity business for many years.

Thornton Rogers is now Capt. Rogers of the 115th Infantry, N. A., with headquarters at Camp McClellan, Anniston, Ala. He was formerly of the sales force of the Baltimore branch of the Chevrolet Motor Co.

Charles C. Traphagen has joined the aviation section of the army and sold his business. He was a Firestone dealer in Richardson, Tex.

Wesley Deem, formerly production manager of the Columbia Motors Co., Detroit, has been appointed production manager of the Lane Motor Truck Co., Kalamazoo, Mich.



Charles S. Owen of Rochester, President of New York Association Automobile Accessory Jobbers.



Henry L. Innes, Vice President and General Manager Doble-Detroit Steam Motors Co.

J. T. Garrity, assistant general manager of the Hartford Auto Parts Co., Hartford, Conn., has enlisted in the service and is now at Camp Upton. Over 80 per cent. of the men that comprised the company's office force a year ago are now with the colors.

C. A. Francis, for 25 years superintendent of the Studebaker Brothers Manufacturing Co., South Bend, Ind., and for five years with the Packard Motor Car Co., died in Detroit on April 29. He was a pioneer designer of automobile bodies and one of the best known men in the industry in that line.

T. G. Young will handle the entire sales of the Gersix Manufacturing Co. on the Pacific coast. He formerly handled Mack and Sauer trucks in the same territory.

A. B. Coffman, formerly with the American Wood Rim Co., has joined the sales promotion department of the Kokomo Rubber Co.

H. A. Holihan has been appointed general sales manager of the Standard Motor Truck Co. of Detroit. He was formerly district sales manager of the Federal Motor Truck Co. and was one time assistant general manager of the Briscoe Manufacturing Co., and was later president and general manager of the Holihan Manufacturing Co.

S. W. Wyman, who has been for years connected with the International Harvester Corporation, has been made western sales manager to devote his special attention to the motor truck section of the business. He will have charge of sales in the western territory under the general sales manager, **O. H. Browning**. Mr. Wyman joined the organization in 1907.

W. J. McDowell has been made assistant sales manager of the Chicago Republic Truck Co., 1702 Michigan avenue,

Personal News of Motor Industry in Brief

Chicago, Ill. Mr. McDowell has had several years experience in the machine tool business and was made special representative in Chicago and the Middle West for the General Vehicle Co. Two years later he was made manager of the electric division of the General Motors Truck Co. He organized the Chicago section of the Electric Vehicle Association of America, and was its secretary and president.

George R. Cullen is now chief copy writer of the Ralph H. Jones Co. of Cincinnati, the advertising agency which handles, among others, the account of the United States Motor Truck Co. Mr. Cullen was formerly with the Chalmers Motor Co., for whom he edited the Chalmers Monogram and other publications. Prior to joining the Chalmers company he was with the Hudson Motor Car Co., for whom he edited the Hudson Triangle. Mr. Cullen announces that a great national advertising campaign is now in course of preparation. He will edit the Floating Power Plant News.

F. C. Brown, who was formerly district sales manager of the Chase Motor Truck Co., has been appointed sales and advertising manager for the Sanford Motor Truck Co., Syracuse, N. Y.

J. George Shaw has organized the Shaw Foundry Co., Milwaukee, Wis. He was formerly president and treasurer of the Milwaukee Steel Foundry Co. The foundry has already engaged on a large production of gray iron castings for the motor car and tractor trade.

John R. Manning has become associated with the sales and advertising department as manager of the Coleman Tractor Corporation. The company is capitalized at \$400,000 and is building a factory on a site about three miles from the centre of the business district in Kansas City, Mo.



E. Le Roy Penstier, Who Will Direct Advertising for Maxwell Motor Co., Inc.

James A. Harris, Jr., is now a captain in the Quartermaster Corps, and is attached to Repair Shop Unit No. 305, stationed at Ft. Bliss, Tex. Mr. Harris has been identified with the White company in an executive capacity since 1909. He was responsible for the White company's advertising policy that has developed the original constructive forms of publicity that have been so long associated with the sale of the White product. He is succeeded by Millard H. Newton, who has been his assistant for a number of years.

A. R. Miller has been promoted as manager of the company's Philadelphia branch, the Troy Trailer Sales Co. of 5 North 21st street. Mr. Miller has traveled the country extensively in his study of possibilities of applying trailers in motor truck service. Prior to joining the Troy organization he was importing agent for Schaefer ball bearings.

Lester I. Weiss, for 18 years connected in the automobile business, has joined the Cadillac sales force, St. Louis, Mo.

Charles Johnson, formerly sales manager of the Maltby Auto Specialties Co., has been appointed fiscal agent for the state of Michigan and Ohio for the Square Turn Tractor Co. He was for many years special representative for the Lovell-McConnell Manufacturing Co., Newark.

D. W. Schilling is now Lieutenant Schilling of the motor section, 104th Ammunition Train, Camp McClellan, Anniston, Ala. He was former service manager for the Baltimore Chevrolet Motor Co.

W. W. Fickling is now on the sales force of the Fulton Motor Truck Co. He is a graduate of the Olds Motor Works and before entering the truck side of the industry was for a period with the Cadillac Motor Car Co.

A. Rubinstein has rejoined the sales force of the United Auto Sales Co., Studebaker and Garford distributor. He was for a time with the Union Motor Car Co., Baltimore, Maxwell distributor.

Joseph P. Hall has been appointed general manager of the Combination Rubber Manufacturing Co., Bloomfield, N. J. He was formerly treasurer and director of the company.

L. R. Scafe, for two and a half years secretary and treasurer of the Saxon Motor Car Corporation, has been appointed comptroller of the Dayton-Wright Aeroplane Co., Dayton, O.

Thomas O'Neil has been made assistant general manager of the Worthington Pump and Machinery Corporation, gas engine works, at Cudahy, Wis. Mr. O'Neil was formerly of the Hercules Gas Engine Co., Evansville, Ind. He succeeds George W. Thexton, who has gone to the Bucyrus Co., South Milwaukee, as works manager.

Dr. Herbert W. Kugler and R. E. Glass have resigned from the Firestone Tire and Rubber Co., Akron, to become associated with the Globe Rubber Tire Manufacturing Co., Trenton, N. J. For nine years Dr. Kugler was identified with the Firestone organization, originally chief chemist and later technical superintendent, in which capacity he had charge of the designing of both the product and manufacturing equipment, and also assumed general direction of all materials and manufacturing processes. Mr. Glass served 11 years as treasurer and member of the executive board of the Michelin Tire Co. He was for seven years general auditor and member of the executive board of the Firestone company.

William Friedlander has organized the United Motor Parts Corporation as manufacturer and exporter of high-grade motor car accessories. The headquarters are at Chicago, Ill.



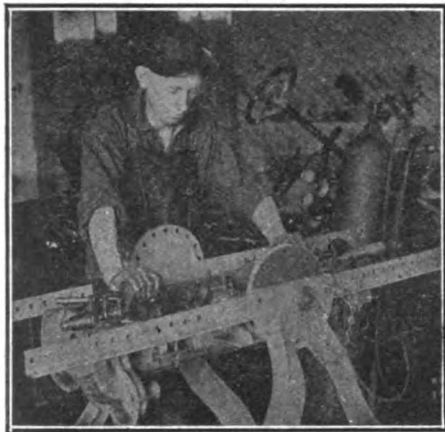
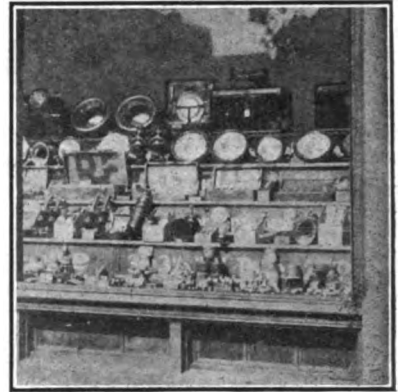
F. C. Brown, Sales and Advertising Manager, Sanford Motor Truck Co.



S. W. Wyman, Western District Sales Manager International Harvester Co.



Accessories Department



CONTINENTAL MOTOR STAND.

This stand is universal handling the Ford engine or any three-point suspension engine from any kind of a passenger car, truck or tractor engine. The stand is portable and can be moved to adjust the engine in any position desired.

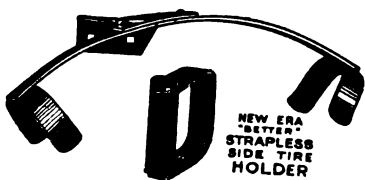
The engine is fitted to the stand in the same position that it is fitted to the chassis and all bolts and clamps necessary are furnished as complete equipment with the stand. It is adjustable in width from nothing to 30 inches. Has a five-inch adjustment in height and can be locked in on over 25 different positions. The stand itself is 39 inches high, occupies a floor space of 29 inches by 36 inches and the shipping weight is 290 pounds.

Manufactured by the Continental Auto Parts Co., Knightstown, Ind. Write for prices and literature.

NEW ERA STRAPLESS TIRE HOLDER.

A side tire holder of strap steel that requires no straps. A locking device is part of the tire holder, as also are the tire supports. A self-expanding carrying rim can be furnished where demountable rims are not used.

New Era Spring and Specialty Co., Grand Rapids, Mich. Price, \$2 single, \$3 double and \$1.50 for the carrying rim.



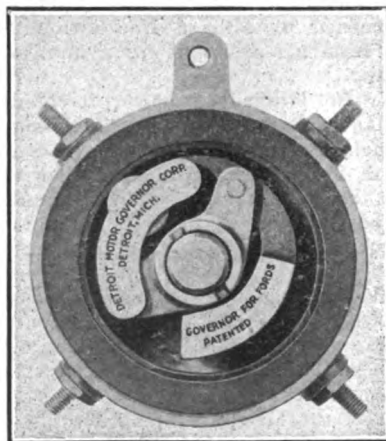
DETROIT MOTOR GOVERNOR.

There is an ever increasing need for a simple, reliable method of governing the speed of the Ford engine. As the Ford car when used for business is usually driven by an operator instead of the owner, it becomes necessary to put some check on the average driver's tendency to over speed the engine.

The governor takes the place of the roller or brush in the Ford timer case, where it performs both the function of the brush and a speed regulator. It does not alter the mechanism, but automatically cuts out the distributor by centrifugal action if the engine is running in excess of 1400 to 1600 revolutions per minute. As the engine is slowed the governor releases the brush and it starts back to work automatically.

It is the first low priced governor to be placed on the market.

Marketed by the Forthe Detroit Motor Governor Co., Detroit, Mich. Price, \$5.



PANVAR CAR REFINISH.

Many car owners would like to have the finish of their car restored, but usually permit it to remain in its shabby condition, despite the effect this has on its value, because they do not care to stand the expense of having the car sent to a regular automobile painter or because they are apprehensive of the results should they undertake the job themselves. It is true that with ordinary methods the average person would not obtain positive results in refinishing a car, a fact which has led one concern to market a finish that can be handled with



excellent results by the amateur. This preparation is called Panvar and it dries over night and is quickly applied, is self-leveling (which means that it will dry out evenly and not show brush marks), dries with a hard, glossy finish within six to eight hours, and the makers claim will not crack, creep or peel or turn white from the effects of water or steam.

The Panvar Co., Bulletin Bldg., Philadelphia, Pa. Write for prices.

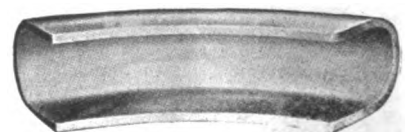
SOLID REDUCING SHELLS.

The solid reducing shell enables the operator to use his larger sectional molds for vulcanizing repairs on small casing whenever the small molds are busy.

By fitting a shell into a large mold the size of the mold cavity is machine finished to a minute degree of accuracy and the shell is in perfect contact at all points. This makes as good a cure as by a direct contact of the tire with the mold.

These shells enable the repairman who has various sizes of molds to double the amount of vulcanizing on small size tires at a nominal expense.

The Williams Foundry and Machine Co., Akron, O. Write for prices and literature.



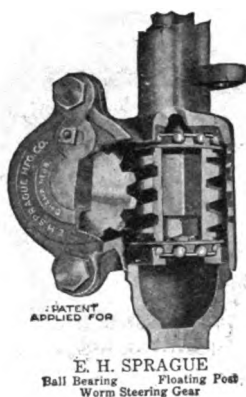
Solid Reducing Shell.

FORD WORM STEERING GEAR.

Many accidents are caused by failure of the steering gear, or because of the fact that the front wheels do not respond to the action of the steering wheel. For this reason many high class automobiles are fitted with irreversible worm steering gears, a type of steering gear that has been favorably received by engineers. The Ford car is not fitted with this type, however, and to satisfy those who desire a worm and wheel type the Sprague Irreversible Worm Steering Gear has been placed upon the market.

The Sprague gear is bolted to the engine and is strongly made. Ample latitude for adjustment is allowed and the manufacturers claim to return the purchase money in case of dissatisfaction.

Manufactured by E. H. Sprague Manufacturing Co., Omaha, Neb. Write for prices and literature.



E. H. SPRAGUE
Ball Bearing Floating Foot
Worm Steering Gear



Weise Leaf Spreader.

WEISE LEAF SPRING SPREADER.

Laminated leaf springs are frequently neglected owing to the fact that it necessitates more or less work to take the springs apart or pry them open for lubrication. When not properly oiled or greased they do not thoroughly fulfill their function, which is that of absorbing the road shocks and vibrations and increase the danger of spring breakage.

When the Weise Leaf Spring Spreader is adjusted to the springs it requires but one simple operation of the lever, which is rotatable and can be worked or operated at any angle spreading the springs apart and locking itself into this position, whereupon the springs may be sufficiently lubricated.

It can be operated on springs varying from 1½ to 2¾ inches wide, all parts being interchangeable and practically indestructible.

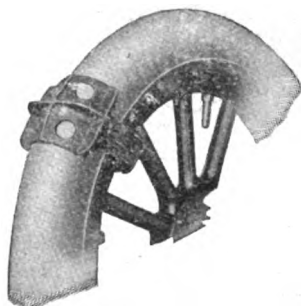
Marketed by A. F. Weise, 133 W. Washington St., Chicago, Ill. Write for prices and literature.

NORWESCO WINDOW DISPLAYS.

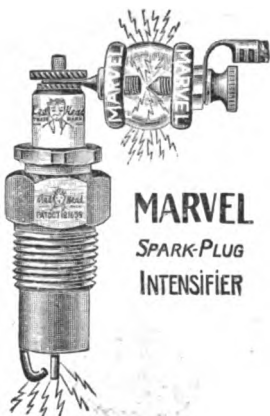
The displays are lithographed in six colors. Behind the filled cans printed on the background is an actual reproduction of each can. In this way the goods are always displayed even after the filled cans are sold.

On both sides of the chemist figure in the circle a pocket is provided holding 50 eight-page folders, "Longer Life for Your Car." These folders thoroughly describe the Big Six Norwesco Utilities. The most natural thing in the world for the waiting customer to do is examine the different utilities. They are all removable. The descriptions are easily read and the prices are plainly marked on the literature that accompanies each display. The display is always there and always ready. The customer can sell himself about as easy as you can sell him.

In the window they are a real sales force—a force that not only attracts the passing motorist, but brings him into the store to buy. The combined effect of



Fulton Mud Hooks.



MARVEL
SPARK-PLUG
INTENSIFIER

Norwesco counter sets and window displays gives a strong sales pulling power. They are silent salesmen and make the store the connecting link between the motorist and Norwesco products.

The readers of the Automobile Journal can secure these display by writing

The Northwestern Chemical Co., Marietta, O.

FULTON MUD HOOKS.

When the car is stuck in the sand or mud there comes the need of a great lift, for which purpose the "mud hook" is designed.

It is made of the best malleable iron and has a heavy stout web strap that is drawn tightly around the wheel rim and holds the hook securely to the casing. It cannot be unloosened until it is unfastened and it does not damage the rubber. With a mud hook on each wheel the car will pull out under its own power—the flanges of the hook producing a pull that forces the car ahead. It will lift the car out and it does not dig in or grind, there being no danger of stripping the gears.

The Fulton Co. Milwaukee, Wis. Sizes 3½ inches, 4 inches and 5 inches, to fit over casings of corresponding sizes. Price per set of two, \$1.90. Extra web straps, per set of 2, 60 cents.

MARVEL SPARK PLUG INTENSIFIER.

A device which overcomes ignition trouble on internal combustion engines. The spark that is produced at the point of the spark plug when the spark gap is in series with the spark plug, results in a fatter, stronger, better spark than would otherwise be produced. The spark produced with the gap permits the use of a leaner mixture, that not only saves gasoline, but also cuts down carbon deposits in the cylinders. This is because carbon comes largely from the partially burned gasoline, resulting from the use of too rich a mixture.

Another advantage is that with the spark gap all plugs give the same intense spark no matter if they are old or new, good or bad, dirty or clean, broken or whole.

Marvel Spark Gaps are adjustable. The correct adjustment will make a spark plug fire perfectly. The slot screw is easy to adjust and if the ignition is weak a narrow gap only is necessary.

Marketed by Wm. Simpson, 603 Insurance Exchange Bldg., Chicago, Ill. Price, 35 cents each. Write for literature.

SHURNUFF GREASE RETAINER.

A grease retainer for Ford axles that consists of three felt washers, one rubber asbestos washer, a cold drawn steel cup and two retaining rings. The retainer remains stationary, the two rivets that are already in the axle, preventing it from turning. The company furnishes a counter display free to dealers with each dozen pair.

Manufactured by the Shurnuff Manufacturing Co., St. Louis, Mo. Price 90c per pair.

SWITCH LOCK FOR FORDS.

This device consists of a strong alloy metal housing that covers the Ford switch. The housing is secured by removing the name plate or the complete metal housing of the old switch and fastening the device over the present switch and securing it with three screws. At the first turn of the key a cam forces out a pair of metal bars, which operate in slots on the inside of the switch. These bars completely cover the screw heads, thus making it impossible to remove the screws. These bars do not operate at each turn of the switch. A bronze contact spring is secured to the cam and when the key is removed this spring makes contact with the central member of the switch, which absolutely grounds on short circuits the four coils, making it impossible to wire around or make an internal connection to operate the ignition system, even in the event of a separate battery being employed. This method does not interfere with the use of a reserve battery or the magneto current. A non-pickable lock is used and two keys supplied, as well as all screws and fittings and the installation can be made, it is claimed, in less than five minutes, using a screw driver only. This device is finished in enamel and nickel.

Manufactured by the New York Coil Co., 338 Pearl St., New York City, N. Y. Price, \$3.25.

RUNNING BOARD SUPPORT.

Few other parts of passenger cars and trucks receive such severe use and become loose, wobbly and rattling, than running boards. They afford a convenient carrying space for battery boxes, tool boxes and luggage, and for this purpose they are often overloaded. There is nothing more dilapidated in appearance and for use than a sagging, loosely supported running board.

The Continental Running Board Support provides additional support to the running board, takes out the rattle and enables the owner to carry batteries, tool boxes and luggage, the weight of which would ordinarily bend the running boards out of shape. This device is a necessity to Ford cars and can be used on any other car or on trucks. Can be attached in a few minutes without drilling holes. It will fit any width and height of frame, being I beam construction, with rods double nutted. Weight, 10 pounds.

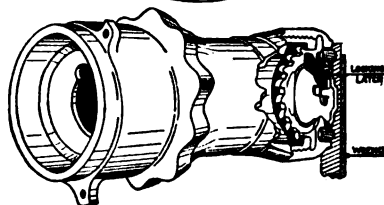
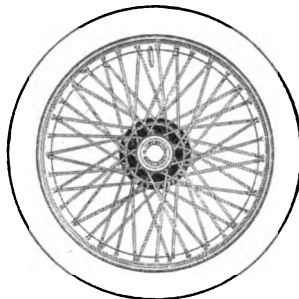
Manufactured by the Continental Auto Parts Co., Knightstown, Ind. Price, \$2.75.

HOUSE TYPE WIRE WHEELS.

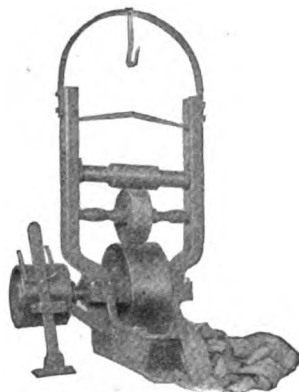
The safety of wire wheels is in their greater strength at a vital point. These wheels are less liable to collapse under the shocks of violent collision or skidding blows. Each spoke will stand a strain of 3200 pounds. There are 54 spokes in a single wheel. A set consists of five wheels, four inner hubs, four hub



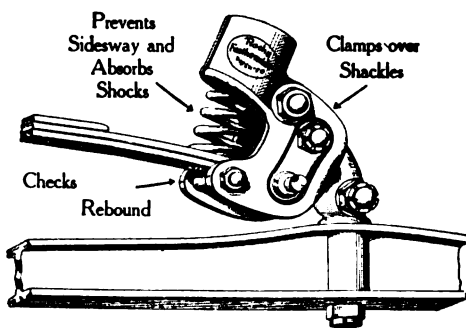
Switch Lock.



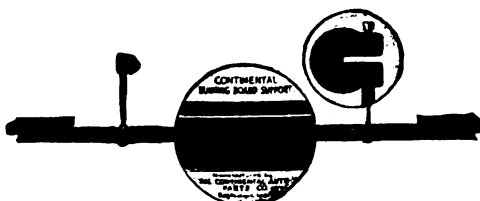
House Type Wire Wheels.



Rag Roller.



Shock Absorber.



caps, one dust cover for spare wheel and two wrenches. These wheels will stand up and keep going under all road conditions. The inner hub has 10 tapered serrations that fit into and grip the corrugation inside the hub shell. The mechanical locking latch is inside the inner hub and is released by the special wrench, but locks itself automatically and prevents the wheel from rolling off.

Manufactured by the Wire Wheel Corporation of America, New York City, N. Y. Price of full equipment, \$60.

AKRON-WILLIAMS RAG ROLLER.

This new time saving device meets a demand from tire factories and large repair shops. It affords greater accuracy and speed in unwinding the wrappings around inner tubes after curing. The mandrel and tube are placed before the Rag Roller, with loose end of rag in contact with roller, then the power is applied and the rag quickly rolled off the mandrel and on to roller. The rag may be removed with ease, after lifting the small rod up to hook at the top. This new roller takes up very little space and may be installed on a bench or at any other convenient place near the machine for wrapping tubes. The price is much less than the old style rag rollers and it is being adapted by many shops.

Manufactured by the Williams Foundry and Machine Co., Akron, O. Write for prices and literature.

FEATHERIDE SHOCK ABSORBERS.

Every car owner knows the objectionable feature of spring action on all cars is the rebound of the spring or its throw back, which causes spring breakage and hard riding.

Featherride absorbers overcome this side sway, the makers claim, at the source of the sway, the spring shackles. They hold the car plumb and give to the Ford the stability of heavier cars. Two small malleable iron jackets, a heavy steel coil spring and two bolts complete the device, and they are easily attached in a short time. They fit over the front and rear shackles and nothing on the car is removed or disturbed.

Manufactured by the Roche Electric Manufacturing Co., Grand Rapids, Mich. Price, \$7.50 per set of four.

THE CONTINENTAL FOOT REST.

For eliminating the annoying objection to driving with the foot accelerator, this foot rest has been designed. It relieves the constant straining effort required in trying to feed the gas steadily when going over bumps and rough spots in the road. With this device the user can feed just the right amount of gas without a "bobble" and the foot does not get tired on long drives, nor is the floor board marred by the driver's heel, as it is without the use of a heel rest. The foot rest is finished in burnished nickel, is adjustable to any position and fills a long needed want on part of car owner.

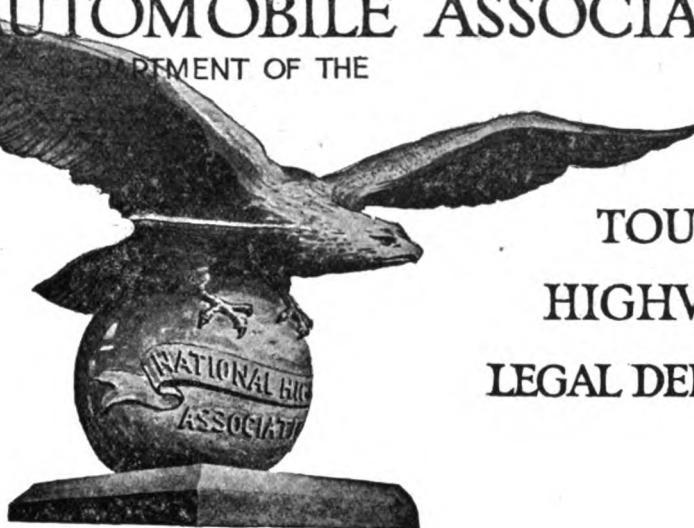
Manufactured by the Continental Auto Parts Co., Knightstown, Ind. Price, \$1.50.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Laws More Strict Against the Reckless Driver

Judges In New York and Maryland Impose Jail Sentences
On Many Car Operators for Speeding and Careless Driving

IT SEEMS deplorable that the almost unlimited freedom enjoyed by the American people in their pursuits of business and pleasure should have resulted in the development of a care free attitude toward other people's rights. This is true, however, and as an outstanding characteristic in the motorist it takes its most conspicuous form in a flagrant disregard for the laws which are enacted to protect the interests of the people as a whole and not the individual. The culpability of the motorist for this state of affairs is only partial, as he does not realize the danger of violating the laws against speeding and careless driving and as the penalty, when caught, has been a matter of dollars and cents, which he could well afford to pay, there was nothing to compel him to live up to his obligations to the state, or to respect the law.

This attitude, an unfair one, regardless of whether or not the operator is fully conscious of his acts, has for some time been fomenting drastic legislation against the motorists as a whole, which now seems to be taking form, and it will probably be but a short while when most of the violations of the traffic laws will be punishable by imprisonment without the alternative of a fine.

That such an attitude is already being taken by legislators and judges is indicated by daily news items from various cities, relating the numerous prosecutions in which motorists are being given jail sentences. On another page in this issue is a story of the en-

forcement of the new Maryland laws under which three drivers were recently sentenced for various terms in the house of correction and six had their licenses revoked, while fines of from \$20 to \$100 were imposed on a dozen other drivers.

In the New York City traffic court, Magistrate House announced that he was tired of warning persons who continually violated the law, and meted out jail sentences on a liberal scale as a warning that the flippant attitude of a certain class of motorists toward the law would no longer be tolerated.

Out of 58 prisoners arraigned before the court, 21 were sent to Blackwell's Island. Nineteen of these drivers received a sentence of five days each, one a sentence of 10 days and another was given a sentence of 15 days for operating a car in a reckless manner. Fifteen of the prisoners were drivers for a large taxicab company in New York, the manager of which explained to the court that the chauffeurs would be discharged upon a second arrest for violating the traffic laws thereafter, as the company did not countenance such violations. The man who was given the sentence of 10 days, pleaded guilty to operating his machine at 26 miles an hour and asked for clemency on the grounds that he had a baby in the hospital.

"What about the babies you might have killed or injured in the street," asked the magistrate as he imposed the sentence.

Another incident of recent date which

will make some drivers stop and think before they mix their booze with gasoline happened in a Fall River court, where the judge held a man under \$10,000 bonds for the grand jury after he had been found "probably guilty" in the district court, on the charge of operating a motor car while under the influence of liquor. Bail to this amount would have been looked upon as an outrageous imposition several years back, a fact which goes to show the extremes to which the authorities must go to check the irresponsible driver.

Possibly the pendulum is swinging too far in the direction of drastic laws, prosecutions and punishment for motor car drivers, but it is nothing over which the "safe and sane" operator need worry, as it is easy to keep within the law.

It cannot be said that in the past the judges have shown any severity toward motor car operators, but on the other hand, taking the attitude of the courts as a whole, it seems that an undue leniency has usually been extended offenders, otherwise the present need of more drastic laws would not exist.

As it was customary in the early days of motoring to take one's arrest for speeding in a spirit of bravado, and this same feeling continues to exist to a large extent, it will take some time to convince a large number of people that they are just as much criminals in the eyes of the law when violating statutes governing motor car operation as the thug who employs a lead pipe or the burglar who enters the house by the window.

Effect of Speeding on Highways

Interesting Figures on Shearing Force of Tires At Different Rates of Speed

The question of injuries to surfaced roads from motor car traffic is one that has been debated in legislatures and elsewhere for a long while without any definite results. The object in arriving at some tangible conclusions in this matter was, of course, for the purpose of assisting in framing equitable laws to tax vehicles in proportion to the wear they inflict upon the highways.

This subject is discussed from an interesting view point by a writer in "Good Roads," although he does not attempt to fix the actual extent of injury by a certain type of car, but makes comparisons as to the effect of travel on roads of different types of cars in relation to varying speeds. The article is as follows:

"In the case of rubber tired vehicles, speed is an important factor. It is the general experience that light motor vehicles traveling at a speed of 18 to 20 miles an hour are not difficult to cope with. That much injury to macadam road surfaces results from heavy touring cars traveling at speeds of 40 and 50 miles an hour is common knowledge to the highway engineer, where it exists to any great extent, demanding the proportionate cost of bituminous treatment, or the selection of a strongly resistant paving material.

"The propelling power of a horse drawn vehicle is communicated to the road through the feet of the horses. Speed is limited and makes little difference. The abrading effect of the steel tires comes solely from a downward pressure varying with the weight of the load, diameter and width of tire. Self-propelled vehicles, on the other hand, communicate their driving force to the road at the rim of the wheel. While the downward pressure, due to weight of load, does little injury, the driving force is very great. It is nearly horizontal, tending to tear away the surface of the road, throwing out the binding material and loosening stones.

"This shearing force increases with the speed—not in direct proportion, but probably in proportion to the square of the speed. Thus, taking 10 miles as a unit of speed, and comparing with speeds of 20, 30 and 40 miles, the shearing force is not merely twice as great at 20, three times at 30 and four times at 40, but instead is four times as great at 20 as at 10 miles, nine times as great at 30, and 16 times as great at 40 miles. At 50 miles an hour the shearing force on this basis would be 25 times as great as at 10 miles.

"Excessive speed is thus exceedingly destructive to improved roads. Motor cars of moderate weight, traveling at a speed of 20 miles an hour, do comparatively little injury to a well-built road. Heavy cars traveling at a rate of 40 or

50 miles an hour do excessive injury, which can be provided for only by expensive types of construction. While these types can be adopted for main highways, as in the case of foundations, the greater net work of minor roads requires speed limitation, in order that heavy construction and maintenance costs may not be unnecessarily imposed. This is the more important at the present stage of road development on this continent when a large mileage must be maintained at low cost while main routes are in course of construction."

Status of Used Car in the Bay State

No Infallible Way of Being Positive of Ownership of Second Hand Car in Massachusetts.

Enclosed please find money order for renewal for one year for the Automobile Journal and your book on magnetos.

Can you please tell me what precautions are necessary in buying a used car in this state? I mean in looking up the title, etc. R. T., Beverly, Mass.

Dear Sir:—Answering yours of the 26th ult. to the Automobile Journal, there is really no infallible way by which when buying a second hand automobile in Massachusetts or anywhere else, you can be positive that the seller is the owner. In Massachusetts you can be sure that he has not given a chattel mortgage upon it by looking up the records in the county where he lives. If no chattel mortgage is recorded there against the car, then if he has given one, it is not good as against you and you can take the car free from any liability for it, but this still leaves open the question whether he is the owner and the only way you can settle this is by compelling him to prove that he was the original purchaser of the car and that he has held it uninterruptedly ever since.

LICENSE PLATES BY MAIL.

Beginning with the first of June the automobile registration department of the Highway Commission of Massachusetts will put into operation a plan, whereby applicants for motor vehicle registrations can have their number plates forwarded by parcel post, provid-

ed they enclose with their application and the fee for registration, the sum of 10 cents to cover postage and insurance of the plate. This plan will reduce the cost of delivery to the applicant to about one-third of what he has to pay if the plates are delivered by express.

The commission came to this decision after experimenting with the system, certain applicants having been notified that they could have their plates sent by parcel post if they enclosed postage. The experiments have shown the plan to be workable and consequently the commission notified the Legislature that there was no necessity to passing the bill that was pending to require the delivery of plates by parcel post.

The commission will print on the application blanks a notice that if the applicant sends 10 cents, over the above registration fee, the plates will be forwarded by parcel post insured. If the postage is not sent with the application the commission will continue to send plates by express at the expense of the applicant.

POLICE ADVISE MOTORISTS.

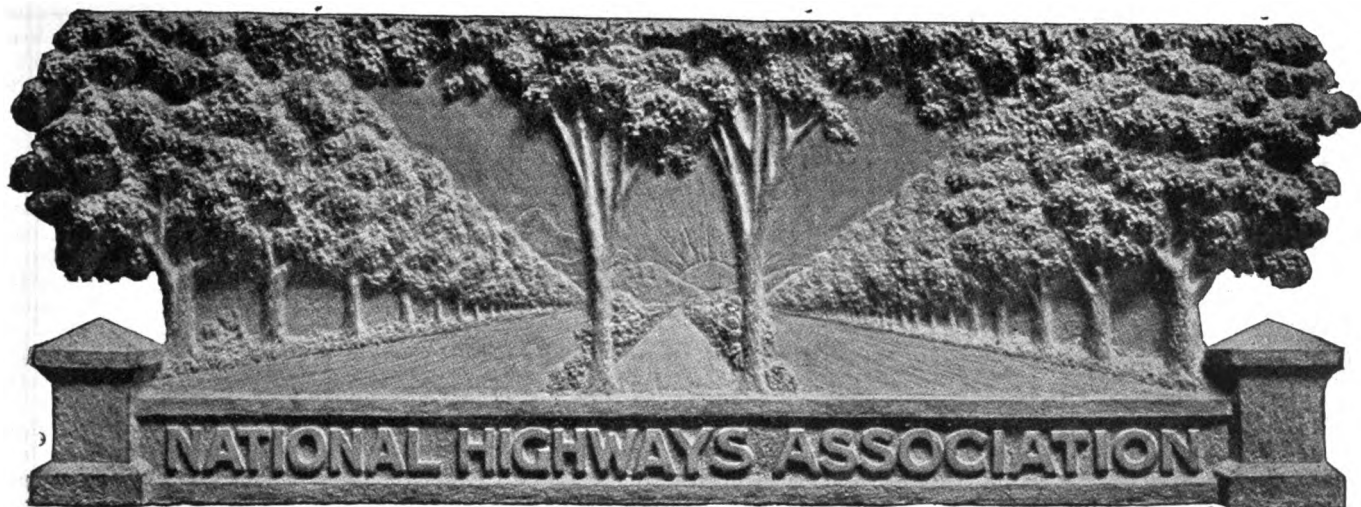
The following notice has been posted in the police station at Rutland, Vt.: "The attention of the officers is called to the continued increase in automobile traffic and the resulting increase in the number of offenses against the automobile laws. It is not the purpose of the department to make wholesale arrests for these petty mistakes of automobile owners, but it is the intention to have the law lived up to. The fairest way is to first call the attention to the mistake to the owners and if not corrected a report should be made to the proper officials.

"Many of the drivers are not making the turns right at the corners, while there have been several complaints about automobiles dashing by electric cars while the electric cars are either taking on or discharging passengers. In the inner traffic district the automobiles should come to a stop and in other parts of the city they should travel slow and be under control.

"The state law has prescribed several proper lenses for use on automobiles and some of these, or other devices, which tend to throw the direct rays from the lights to the prescribed distance in height at a certain distance from the car should be used."

MEMBER PICKS UP SHOES.

Some time in the early part of this month some two or three pair of shoes and odd shoes (not automobile tires) were found on Chestnut Hill avenue, Brookline, Mass., and they fell out of an automobile which passed by Mr. F. Stadniller of Cheshire street, Jamaica Plain, Mass., who now holds them waiting for the party who lost them to call. Mr. Stadniller can be reached by phone at his residence and will be glad to return the shoes to the right party.



Maine Highways In Exceptionally Good Condition

Favorable Weather Has Put Roads A Month Ahead of Normal Seasons. General Information On Highways In New England

The highways in Maine are from three to four weeks ahead of normal seasons as a result of weather conditions during the past winter and this spring according to a bulletin issued by the Touring Bureau of the Maine Automobile Association. At this season of the year the majority of the roads of the state, outside of the improved roads and those in the immediate vicinity of large centres of population, are usually unpassable because of mud and frost holes and all of the roads in the state are not absolutely safe until well into May.

Practically all of the main thoroughfares of traffic, as well as the majority of the principal cross roads, this year are perfectly safe for the automobile traffic at the present time.

It was believed that the intense cold would result in more frost in the ground than ever before in the history of the state. On the contrary, however, the thick mantle of snow which prevailed throughout the winter prevented the frost from penetrating to any depth whatever. The spring came on early, with an exceptionally warm period of weather, taking the snow off gradually. The situation then developed that as soon as the snow and ice were off the highways they were almost immediately dry and the only bad places in the roads at the present time are occasional spots where the highways run through thick woods and the sun has not yet melted the snow. These places, however, in a day or two will become actually dusty and passable for automobiles in almost every case.

Of course, as yet very little road work has been done, as the early spring found the local town patrol men quite unprepared. This situation, however, is being rapidly remedied, and many of the towns

have started on their spring repairs and dragging.

With the State Highway Department the situation is different, as its patrol men have been on the state highways for several weeks and they are rapidly being brought back into summer conditions. The main highway between Boston and Portland is now in excellent condition. The state highways along the coast to Rockland and Bangor, as well as Augusta and Waterville, are also perfectly passable. The local roads of the Sebago lake region, where the famous fishing season is now just beginning, are also in splendid shape for this season of the year.

Maine has had almost constant sunshine for five weeks with no heavy rain storms, and the roads are not badly washed and are in the best early spring condition in their history. For the past two or three years there have been heavy rains in Maine in the spring, and the roads were badly torn up and rendered practically impassable in many cases as a result.

The bulletin also makes the following reports on various highways in Maine:

The road from Portland to Bethel via Gray, Poland Spring, South Paris and Bryant's Pond is now quite passable.

The main highway from Portland to Bangor via Lewiston, Winthrop, Augusta, Waterville and Newport, is in excellent condition.

The road from Portland to Rockland is fine and a new stretch between Brunswick and Bangor is particularly smooth. The work on the bridge is not yet completed, so care should be used at this point.

The following is a report on road conditions between Portland and Farmington: Portland to Poland Spring, very

good; to Danville Junction, fair; to Auburn, bad; but this is due to the fact that the road is now being prepared for rebuilding and possibly may be closed to traffic in a short time, a good detour being provided; Auburn and Lewiston to Winthrop, excellent; Winthrop to Readfield, fair; Readfield to Mount Vernon, fair; except muddy along the shore of the lake and rough and cut up in the vicinity of Vienna. Some bad sand for about two miles approaching Farmington Falls, but good from that town to Farmington.

The road conditions between Portland and Boston are good.

The best route between Springfield, Mass., and Hartford, Conn., is via the west side of the Connecticut river. The road here is excellent, except for a rough stretch coming into Hartford.

Between Springfield, Mass., and Albany, N. Y., via Jacob's Ladder and Pittsfield, Mass., the road is in good condition for almost the entire distance.

The state highway between Boston and Springfield, Mass., via Worcester, is in fine shape.

The road between Worcester, Mass., and Providence, R. I., is in good condition.

The highway between Portsmouth, N. H., and Camp Devens, at Ayer, Mass., is in good condition by the following route: Portsmouth, N. H.; Smithtown, N. H.; Amesbury, Mass.; Lawrence, Haverhill and Lowell, Mass.

Motorists driving through the State of Connecticut are advised to use care in doing so as a great many arrests of out of state motorists are being made by the Connecticut state police. The reason for this activity at this time is that the State Motor Vehicle Commissioner has ordered a strict enforcement of the law.

PLATE XXII.

TWO-CAR BRICK GARAGE WITH WOODEN ROOF

Plain, Substantial Structure for Town or Country Residence. An Improvement for Any Estate

(Designed by Architectural Department of the Automobile Journal Publishing Co.)

THERE are certain types of garages which are designed more to meet property requirements than to strictly fulfill the needs of a car owner for a place to house his automobiles. The erection of such structures on town or country estates is necessary to maintain the values of the estates, as the valuation of property is readily depreciated by placing a building upon it that detracts from its appearance or which is not of the same degree of quality as another upon the same site. For this reason the object of economy would be defeated by erecting a cheap wooden garage upon an estate with a costly brick, stone or cement house, and an additional expenditure of several hundred dollars for a garage matching the dwelling in structure and type would prove the most profitable in the event the property was to be sold.

In the accompanying plate is a plan and elevation of a garage answering these requirements. It is of substantial construction and moderately ornamental and nominal in cost for a structure of its type, calling for an outlay under normal labor and materials costs of about \$1100.

The outside dimensions are 20x22 feet and the main walls of brick 10 inches thick, with a two-inch air space, are erected on the concrete underpinning, which is carried nine inches above grade and formed of concrete as an extension of the foundation walls. The latter should be at least a foot thick and extend below grade 42 inches.

The roof frame is built up on 4x6 inch plates, bolted to the tops of the brick walls, and is constructed of rafters 2x8 inches, laid 18 inches on centres. It is boarded in with $\frac{7}{8}$ inch hemlock boards laid three inches apart and covered with extra grade shingles laid $4\frac{1}{2}$ inches to the weather. White pine stock is most suitable for the exterior woodwork. Galvanized iron gutters and conductors are serviceable and should be painted with two coats of white lead.

The doors are 8x9 feet by $2\frac{3}{4}$ inches of white pine stock. The upper panel of each door is a nine-pane sash, which together with four windows in the walls, affords ample light in the interior.

If the owner should desire to use the attic

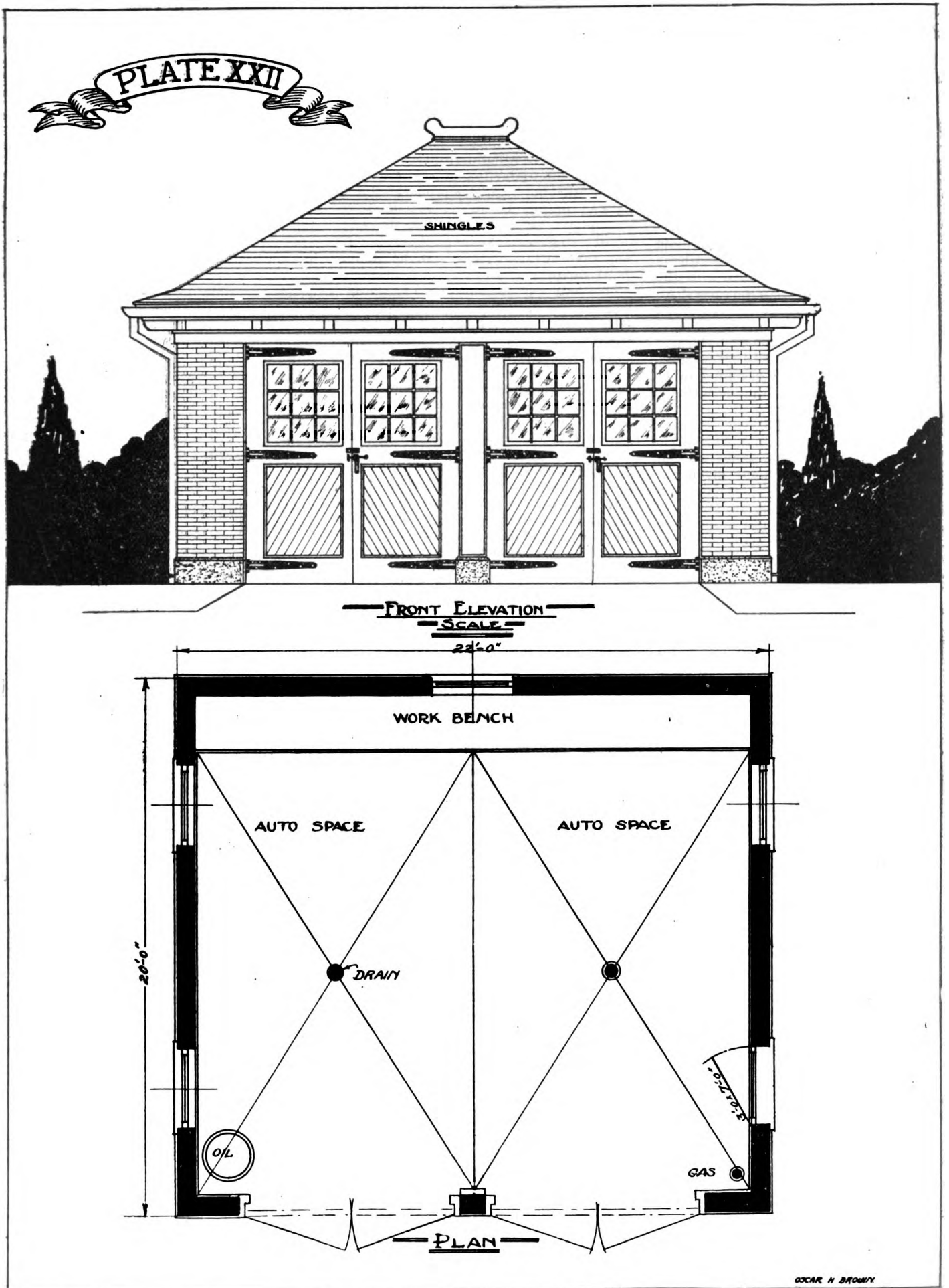
space for storage it would be necessary to build a second floor on 2x8 inch joists placed 16 inches on centre, covered with plain pine boards and sheathed underneath with either $\frac{3}{4}$ inch pine stock or metal lathe if it is intended to plaster the ceiling. All-metal ceilings, of which there are a number of types and makes on the market, are inexpensive and easily erected. This type of ceiling is also desirable, as with brick walls its use reduces the fire danger to a minimum.

Two large doors, rather than a single one, entails somewhat greater expense, but are preferable because they obviate the necessity of manoueuering the cars about in the garage, and the attendant danger of damaging them. To avoid opening the large doors for entrance, a smaller door is placed in the left side.

The doors are equipped with Stanley wrought iron garage door hinges, consisting of a set of No. 1459 hinges and No. 1052 bolt. These hinges, designed for heavy doors, are exceptionally strong. They are equipped with ball bearings fitted between the hinge joints. Powerful leverage is provided by the long leaf, which prevents the doors from sagging. It is economy to hang the doors on a high grade hinge even considering first cost, as the jamb only is mortised, the door put in place and the surface leaf applied to the face of the door with either carriage bolts, lag or wood screws. The No. 1459 hinge is 36 inches long, with a $2\frac{1}{4}$ inch offset and $4\frac{1}{2}$ inch throw and a pad four inches wide.

No heating apparatus is shown in this garage, but whether an individual heating system is installed or steam or hot water piped from the house, it would be advisable to place the radiators beneath the long bench at the rear of the building, as this arrangement would result in the heat being concentrated at the rear of the building and near the front of the car radiators, where mostly needed in winter time.

In erecting this type of garage the services of an experienced builder would be required unless the owner could hire a well trained mason and carpenter by the day. All the materials employed are readily obtainable in any city or at a country general store.



N. A. A. A. J. Letter on Show Situation

Commissioner Webster Discusses Attitude of M. A. M. A. Toward Organizations Exhibition

National Commissioner W. W. Webster of the National Association of Automobile Accessory Jobbers has issued an open letter to members bearing on the situation created by the announcement that the organization would hold an accessory show in connection with its convention next fall. It deals with the Motor and Accessory Manufacturers' attitude toward the N. A. A. A. J. show and reads as follows:

"A number of their general letters of April 23rd, on the above subject, have reached this office, stating among other things that they will 'assume jurisdiction' over our show.

"I incline to the belief that if they rightly understood just what we had in mind of giving, a trades show without charge, they would not have given the matter a second thought or assumed an arbitrary position. It may interest you to know that long before our association decided to embark in the show business, arrangements were on foot, plans well under way, blue prints had been prepared and options secured to start a similar undertaking for the especial benefit of the accessory manufacturers, inspired I understand by a number who became dissatisfied with the treatment they had received and others who were willing to join hands with them. The feeling in this direction is so strong—has become so thoroughly crystalized—that mere resolutions or arbitrary mandates will not keep it down, but an accessory show of the kind we propose to give is bound to come.

"The announcement issued on March 21 brought out a great number of letters and in many cases the authors very severely criticised the treatment accorded them on show matters in the past. Some openly expressed their dissatisfaction and stated they had about concluded to discontinue making exhibits at the annual shows, while others took the stand that if the order issued on this matter was enforced they would resign from that association rather than submit. It might not be amiss if others feel in the same way to at least take it up with these people and explain the great injustice they are imposing upon you, provided you think well enough of it, or if it is of sufficient importance to you to do so.

"I am trying to reconcile their inconsistency in differentiating against our show when it is a known fact that their members have made exhibits during show time in different hotels, where they bought space and where no admittance fee was charged—that is our case identically—a distinction in practise without a difference in principle.

"In the many letters I have sent out pertaining to the show I have studiously refrained from making any mention

whatever of, or alluding to, these expressions of dissatisfaction in any way, feeling it was not just the proper thing to do and preferring not to say anything that might be construed that we were even trying to make capital, or in any way take advantage of them, but I now feel I should give you all the facts.

"I firmly believe nothing has so materially contributed to the marvelous growth and splendid success of our association as the broad spirit of liberality and fairness, on which it has at all times conducted its affairs, and while it is true we are sympathetically jealous of our rights and exercise all fair and honorable means in guarding them, for this right minded persons can only respect us.

"It matters not where, when or how our members show their goods, improve their condition or promote their interests, so long as they properly conduct themselves and make a creditable exhibit in the show we intend to give. I feel it a sense of duty, however, to here clearly point out to you and especially to such of our members who may for the time being, through coercion or otherwise be kept from exhibiting at our show, that exhibits in your line will be made by one or more of your competitors, who will naturally make friends, take orders, sell goods and open new accounts, possibly with your customers. Just how long you can, or will, stand this sort of thing time alone and your ledger accounts will tell, for the great army of the better class of jobbers who you know attend our conventions, will also attend our show and they are a factor which must be reckoned with, for they certainly control the purchasing power and that supports shows.

"It is equally fair to presume that they will not take kindly to any assumption or interference with what they may consider their rights, for all letters received at this office from the jobbers throughout the country lend the highest possible indorsement to our show propaganda.

"Another important consideration is if you absent yourself from such a splendid opportunity of being thrown directly in contact with your customers—the jobbers—as we offer, and which opportunity has, as a matter of fact, never before been offered in this condensed and practical form, you will naturally be loser.

"In the maximum space at our command all but about 30 units have been subscribed for and at this writing I am worried a great deal more about how we are going to be able to take care of our members and supply them with space than I am about anything else.

"This somewhat lengthy letter is not sent for the purpose of unduly influencing you one way or the other, but rather for the purpose of pointing out to you the various phases of the situation, for

insofar as our show is concerned it will go on to the end and will be a success beyond any doubt and I regret very keenly, as I stated in the opening of this communication, the attitude of that association on this question, and after you have had answers to some of these questions and other points I have made, cleared up to your satisfaction, you will then be in a reasonably good position to decide what you may wish to do.

"A current issue of a trade journal states 'our application has been turned down by the directors of that organization.' That is not so, as we have made no application nor have we had any correspondence with that organization about the show one way or the other.

"You know it is not only my wish, but it is our disposition and policy to go along in peace, harmony and good will with all kindred organizations and to do those things which will bring out the maximum of good with the minimum of friction in the firm belief that there is room in this country for all and that the policy of 'live and let live' is 'bound to and finally will prevail against all odds.'

CHEVROLET ZONE, PARTS AND SERVICE MANAGERS MEET.

The zone, parts and service managers of the Chevrolet Motor Co. held a meeting at the plant, Flint, Mich., during the first four days of the present month.

The meeting was presided over by F. A. Bonham and addresses were made by C. Campbell, assistant to general manager of sales; J. H. Newmark, manager advertising division; C. R. Scharff, traffic director; C. A. Whitacre, assistant to chief engineer; C. F. Barth, factory manager, motor and axle division; T. E. Houghton, factory manager, Flint plant, and M. E. Coyle, comptroller.

In addition to an inspection trip through the Flint factories, a film showing the making of Willard Storage Batteries was given, and addresses delivered by representatives of Electric Auto Light Co. and Remmy Electric Co.

Those present in addition to the names given above were: L. P. Puckett, service manager, Chevrolet Motor Co. of Texas; C. C. Vaughn, manager parts and service division, Chevrolet Motor Co. of St. Louis, Inc.; George D. Spinks, manager parts and service division, Chevrolet Motor Co. of Kansas City; A. K. Steigerwalt, manager parts and service division, Chevrolet Motor Co. of New York, Inc.; M. A. Sandifer, manager parts and service division, Chevrolet Motor Co. of Atlanta; F. R. Daniels, manager parts and service division, Chevrolet Motor Co. of Canada, Ltd., and W. H. McIlhenry, manager parts and service division, Chevrolet Motor Co. of Minneapolis.

HAL MOTOR CAR CO. REORGANIZED.

The Hal Motor Car Co., Cleveland, O., has been reorganized with additional capital and the manufacture of the 1918 models will be continued. The new organization will be known as the Hal Motor Co.

J. H. FAW, INC., MOVES TO NEW OFFICE AND SALESROOM.

J. H. Faw, Inc., New York City, have moved to 37 Warren street, occupying one entire loft at that address. The new quarters provide ample accommodation not only for the general office and salesroom, but an exceedingly light and commodious shipping room. A systematization of their various lines enables them to rapidly and efficiently execute such orders as are not placed with their factories for direct shipment.

Many both in and out of the trade will miss from its accustomed place the overhanging sign of J. H. Faw, Inc., which for seven years has marked the entrance to 41 Warren street, New York City. Comparatively small in size, it was so fortunately located as to be visible from City Hall Park on the east and the "L" on the west and to one at all acquainted with the general locality, city street signs were unnecessary.

The removal prevents a replacement of the familiar sign, but J. H. Faw and Warren street are evidently unseparable, as the new location is but a few doors east.

CURTISS AEROPLANE AND MOTORS CORP. MAKES LARGE EARNINGS.

The Curtiss Aeroplane and Motors Corporation is understood to have earned a net of upward of \$2,000,000 after preferred dividends. This equals nearly \$10 a share on the \$217,000 of common outstanding.

It is estimated that the annual report will show that the company is now doing business at the rate of \$5,000,000 a month, which compares with less than \$2,000,000 average for 1917, and about \$700,000 for 1916. Production should be brought up to nearly \$10,000,000 monthly before the end of the current year. Although the balance sheet will probably show a net of \$2,000,000, the amount carried for profit and loss surplus will not be much in excess of \$700,000. Over \$1,000,000 in patent valuations has been written off out of earnings.

LARGE INCREASE EXPECTED IN MICHIGAN REGISTRATIONS.

The number of licenses already issued in Michigan this year is almost as large as the total for 1917. Last year 206,000 cars were licensed, and the 1918 permits are already at the 206,000 mark. The estimated number for the year is 250,000.

H. W. BADENHAUSEN JOINS NEW ERA SPRING AND SPECIALTY CO.

H. W. Badenhause, who for the past year was general manager of the War-nola Manufacturing Co. in New York City, has joined the New Era Spring and Specialty Co., Grand Rapids, Mich. He is general manager and treasurer of the company.

He was formerly connected with the company as eastern representative, with headquarters at New York.

Henry L. Innes New General Manager of Doble

Former Assistant to W. C. Durant in
General Motors Will Have
Charge of Production.

Following the reorganization of the Doble-Detroit Steam Motors Co. and its absorption of the General Engineering Co., comes the announcement of the appointment of Henry L. Innes as vice president and general manager. Mr. Innes recently left his position as factory manager of the Chevrolet plant at Flint to become assistant general manager of the General Motors Co. of New York, in active charge of production.

Mr. Innes will have the responsibility of production and his appointment will be regarded in motor circles as strong evidence that the Doble-Detroit Steam Motors Co. is preparing to forge ahead and occupy the position in the industry that the admirers of the Abner Doble principles of automotive transportation believe is warranted.

Mr. Innes gained his reputation in the motor car industry through his association with Dodge Brothers, the Chevrolet and the General Motors. But he had a long and arduous training that illustrates the thoroughness of the man. His father was one of the old time lake captains and for 40 years was commodore of the Michigan Central's car ferry fleet. Young Innes followed in his father's footsteps. At 19 he possessed a master's papers. He became first officer of the old Northwest and shortly thereafter succeeded his father as commodore of the Michigan Central's car ferry fleet.

About this time Mr. Innes decided he ought to know something about steam engines, so he left his job, took up work in the engine room and won his chief engineer's papers.

For five years he was in Mexico, where he built and equipped a ship yard for ex-Senator William A. Clark and constructed vessels for the Mexican rivers.

About 15 years ago Mr. Innes became interested in the internal combustion engine. He went to work in the shop of the Crescent Motor Co. of Cincinnati, in order to learn the gasoline engine. Then he went to the Hastings Motor Shaft Co. of Hastings, Mich., manufacturers of motor shafts, where he worked up to the job of superintendent. The next step in his progress was taken to learn all about axles and was a job with the Lewis Spring and Axle Co. of Jackson. Mr. Innes had long been a friend of John and Horace Dodge and finally joined the forces of Dodge Brothers, with whom he remained four years. He conducted all the tests and experiments on the first Dodge car. His achievement in this field attracted the attention of William C. Durant and he was won over to the Chevrolet at Flint, where he became factory manager. His success was so great that it was decided to move him to New York, where he was to be actively responsible for production of the General Motors. While in Flint he was president of the Manufacturers' Association of that city.

Mr. Innes' connection with the Doble-Detroit came about accidentally. He had long been familiar with steam as a motive power in all its phases and was greatly interested in the Doble-Detroit. While in Detroit recently, on his way to New York to assume his new position with the General Motors, he took advantage of his brief visit to ride in the Doble-Detroit car. A casual trip up and down the boulevard became an all-day whirl and his interest grew so profound that the next steps in his decision to join forces with the Doble-Detroit were made more or less inevitable. Mr. Innes will take up active work in his new position within a few days.

SANFORD TRUCK AGENCY IN WESTERN PENNSYLVANIA.

The Sanford Motor Truck Co. of Syracuse, N. Y., has closed the agency for the sale of Sanford trucks in Western Pennsylvania with the Painter-Dunn Co., Centre and Millvale avenues, Pittsburgh, Pa. The Pittsburgh house is one of the leading Overland dealers.

The Calendar of Coming Events

RACING.

May 16—Uniontown. Uniontown Speedway Association.

May 30—Sheepshead Bay, N. Y. Championship races.

June 22—Chicago. Chicago Speedway.

July 4—Cincinnati. Cincinnati Speedway.

SHOWS.

May 3-7—Lima, O. Ohio State Automobile Association.

Sept. 23-28—Chicago. National Accessory Show for Fords. Coliseum.

ASSOCIATIONS AND ENGINEERING.

May 10—New York Highway Traffic Association. 8:30 P. M. Automobile Club of America Building.

May 13-18—Cleveland. War Convention of Machinery, Tool and Supply Industry of the United States.

June 3-4—Chicago. National Gas Engine Association. Eleventh Annual. Hotel Sherman.

June 5-12—Hot Springs, Va. National Association Automobile and Accessory Jobbers.

June 17-19—Dayton, O. Society Automotive Engineers. Annual Midsummer Session.

June 26-28—Buffalo, N. Y. American Society of Heating and Ventilating Engineers.

Sept. 2—Cripple Creek, Col. American Institute of Mining Engineers.

Nov. 14-15—New York. Society of Naval Architects and Marine Engineers. Twenty-sixth general meeting. Engineering Societies Building, 29 West 29th street.



GREASE FROM BRAKE DRUMS. (Figure 406.)

Owners of Fords are often troubled by grease working out into the brake drums from the differential housing, lessening the efficiency of the brakes and making the wheels look unsightly. One means of preventing this annoyance is accomplished by boring a hole $\frac{3}{16}$ of an inch in diameter half way between the differential and the brake, on each side of the axle. As the grease reaches these holes it will run out before it gets into the brakes. This suggestion is thoroughly practical and will not injure the efficiency of the axle.

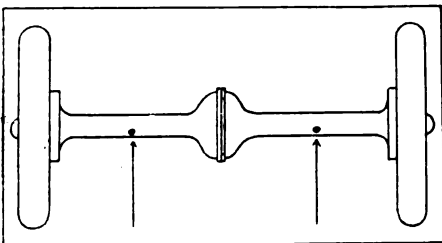


Figure 406.

FILLING AND TESTING BATTERY.

A glass tube can be used very handily about the battery of the car. If it is inserted in the battery and the finger held over the top of the tube, the water level can be determined by raising it and inspecting the depth of water in the tube. When filling the battery with water the glass can be held against the side of the tube, allowing the water to flow evenly into the hole without danger of spilling, as so often is the case.

OBTAINING A COLOR LINE.

One of the first things that bothers the novice when painting his car is the matter of getting a good line in color on the paint. An amateur will find it very difficult to make a regular, smooth and even width line with the ordinary painters' lining brush without many weeks of practise.

An ordinary draughtsman's ruling pen can be used for this purpose and will give a result equal to the lining done by an experienced painter. Water proof ink for use with these pens may be purchased at any draughtsman's supply house, though most kinds of paint can be used in the pen.

NON CHANGEABLE SWITCH KEY. (Figure 407.)

There are many suggestions to prevent the Ford from being stolen and one that is thoroughly practical is hereby illustrated. The switch plate is taken off and two holes drilled over and under the switch key entrance. Round headed bolts are inserted into these holes with nuts on the inside and the rest of the bolt filed off. These bolt heads will project about one-quarter of an inch from the surface of the switch plate and the switch key cannot be inserted unless a slot is filed from the switch key. This should be filed with a rat tailed file and it is well to have an additional key in case of emergency. The two bolts are necessary at both the top and bottom of the plate in order that a key in the hands of a person not authorized to take the car will be useless.

ADJUSTABLE GASOLINE TANK. (Figure 408.)

Many times in the garage there comes the need of using gasoline for use in carburetor repairing and in washing small parts. Unless the gasoline is nearby the repair man must stop and find a utensil to get gasoline in and there is always a waste, as the picked up can has not the proper spout for feeding the gasoline in the proper amounts as wanted.

A small square can with a petcock attached can easily be made and hung at any height convenient to the work man over the repair bench. A rubber tube may be attached to the petcock and the other end attached to a carburetor, assuring one of the proper float level, or left free to run a small stream of gasoline on a part to be washed. Being air tight this device is economical and handy.

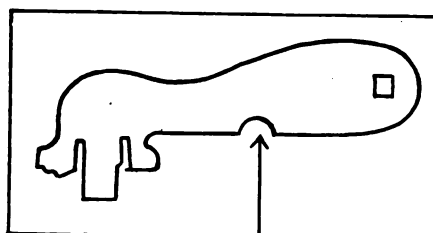


Figure 407.

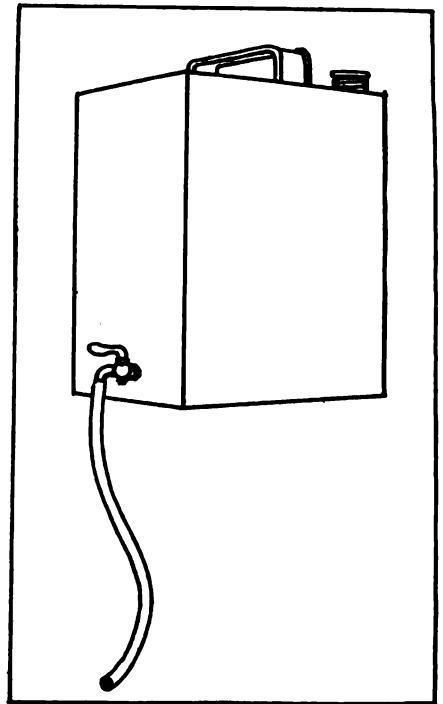


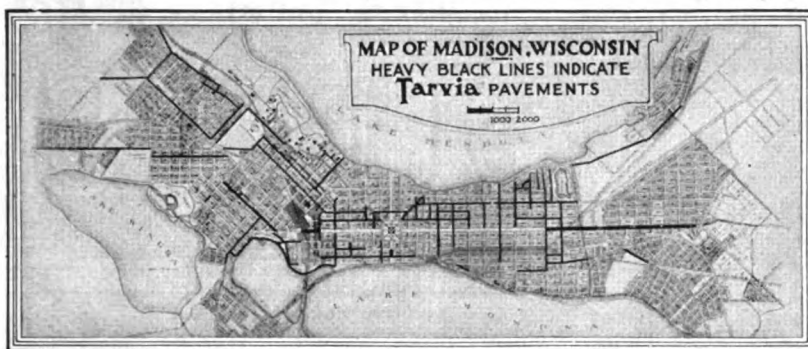
Figure 408.

LUBRICATING SPRINGS.

One of the most annoying things about an automobile is a squeaky spring. When a motorist complains about it to his garage man or to the dealer who sold him the car, it is evident that he has not been using the right kind of lubricant. Plain oils and greases squeeze out and permit friction between the bare metal of the leaves.

The Joseph Dixon Crucible Co., manufacturers of Dixon's Motor Graphite, gives this advice about lubricating the springs: Jack up the car so that all the weight is off the springs and spread the leaves apart with a screw driver or instrument provided for that purpose. Then smear a creamy mixture of kerosene and Motor Graphite between the leaves.

Springs thus treated will ride much easier and will be free from squeaks. If the graphite is of pure flake variety it will adhere to the surfaces, filling up and smoothing over the minute irregularities, and will not squeeze out.



Tarvia
Preserves Roads
Prevents Dust

Let Us Introduce You to a Town that Believes in Good Roads—

Did you ever see a more interesting lay-out of a city than this of Madison?

Lake-fronts at top, bottom, and end. And what a waist-line! A lithe young American city of the very best and most progressive type.

Its streets are its special care. Its motor-cars are so many, its trucking is so heavy, that the town demands streets that are dustless, mudless, and bumpless.

Therefore, it is a Tarvia town.

Note the black lines in the map: *those are Tarvia streets—39 miles of them!*

Madison began with Tarvia in 1908. The people liked it so well that street after street has been treated with Tarvia.

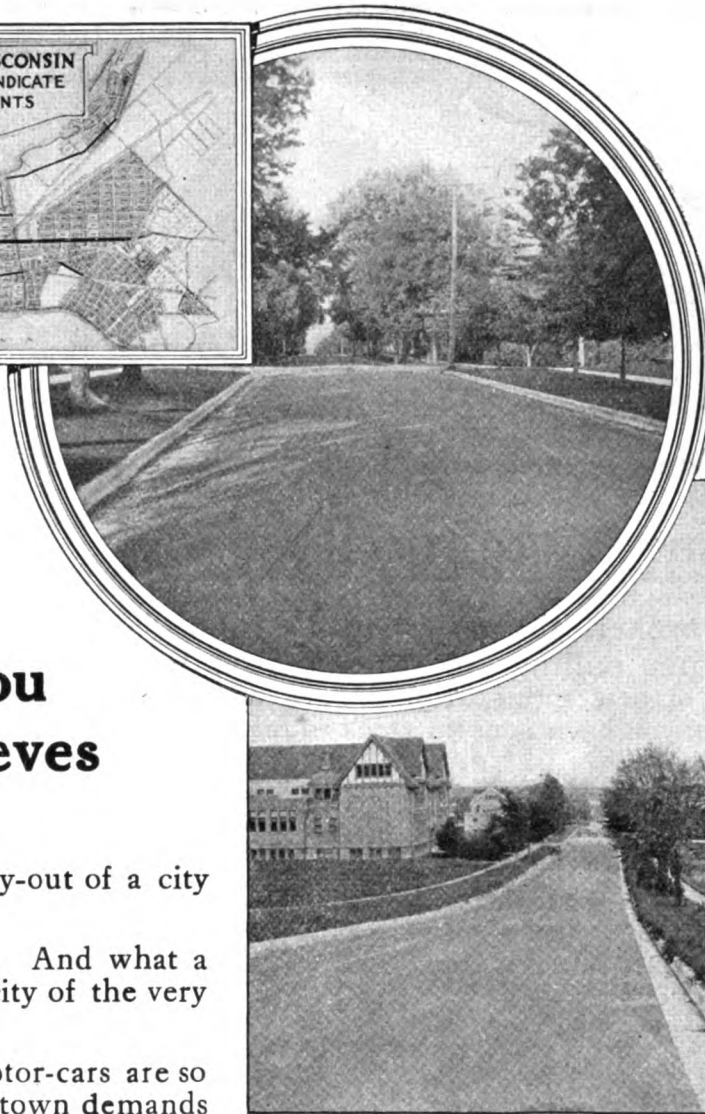
The officials gave the people what they wanted, namely, streets without dust, without mud, without noise, and *without big maintenance expense.*

Madison continued to use Tarvia extensively during 1917 and the Tarvia mileage in Madison will be bigger this year.

The Street Superintendent has written recently in a published article about the streets of Madison:

"We have been informed by officials from various cities who have visited Madison to inspect our streets and obtain cost data of maintenance that we maintain our streets at a lower cost than any other city in this section."

Now, when the nation needs good roads so that motor-trucks can help out the great railroad congestion, it is more important than ever that every community should investigate the road proposition thoroughly.



Upper Picture—Madison Street, Madison, Wisconsin, constructed with "Tarvia-X," penetration method, 1912.

Lower Picture—Regent Street, Madison, Wisconsin, constructed with Tarvia Topeka Mix on old macadam base, 1915.

Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems.

The advice of these men may be had for the asking by any one interested.

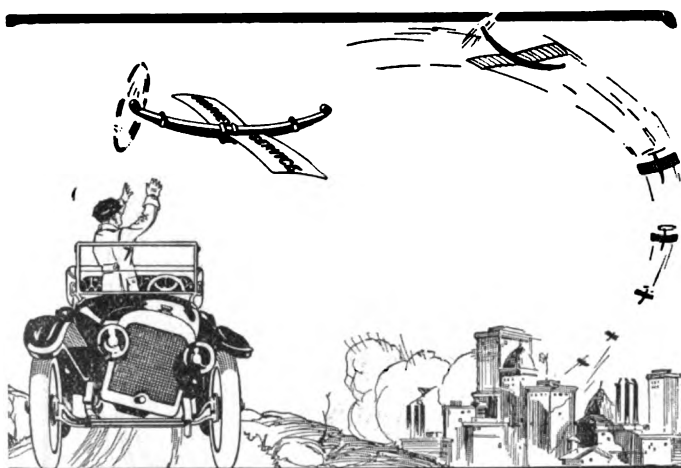
If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will have prompt attention.

The **Barrett** Company

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh Detroit
Birmingham Kansas City Minneapolis Nashville Salt Lake City Seattle Peoria
THE BARRETT COMPANY, LIMITED:
Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.



(When Writing to Advertisers, Please Mention The Automobile Journal.)



Harvey to the Rescue

A broken spring—a frenzied customer calling for help—demanding a new spring “rush”! It’s an odd size; you have none in stock to match it!

And yet, you realize the importance of giving this customer real service, not particularly for the profit in this one job alone, nor even for the trade of this one customer, but because service at a time like this will bring the word-o’-mouth publicity which follows naturally when a customer is pleased.

So you call

Harvey
RACINE

to the rescue. There’s a Harvey Jobber near you, you get him on long distance, in a few words tell him your needs, and then turn to your customer with the satisfied feeling of work well done, because you know that already the exact spring you want and the best spring money can buy is speeding to you.

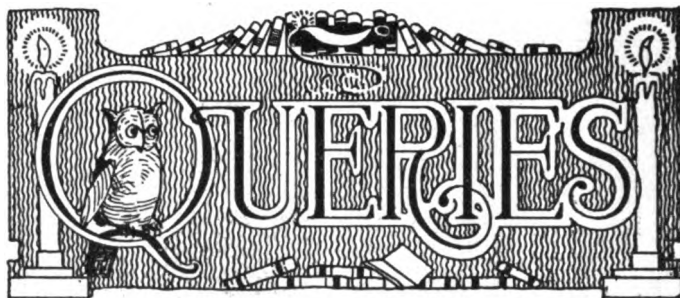
“That’s service”! says the customer. And when his car is on the road again he tells his friends about it and they say with him, “That’s service”!

That *is* Service, Harvey Service, and it’s always ready to help you build a business that will be respected far and near. They may forget the name of the spring you used but the memory of the service you have given will never be lost.

There’s A Harvey Jobber Near You

Drop us a card and we will send you his name and our Spring Book giving complete weights, styles, measurements and prices of over 900 different kinds of springs. Write today—you may need Harvey Help tomorrow.

Harvey Spring & Forging Co.
915 17th St., Racine, Wis.



NOTICE TO READERS.

THIS department contains the Mechanical Editor’s answers to readers’ inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer’s full name and address, and the car or part in question should be properly identified, by mentioning the maker’s name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW HAVE YOU SILENCED SQUEAKS AND RATTLES IN YOUR CAR AND WHAT SPECIAL DEVICES HAVE YOU USED TO ACCOMPLISH THIS END?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 31st of May. The contest is open to every one.

MANY ACCESSORIES IMPROVE CAR SERVICE.

(S. B. B., Newport, R. I.)

Best Letter.

Your question in the April 10 issue of the Automobile Journal, “What Accessories Are You Using That Have Improved the Utility or Convenience of Your Car?” is to me one of the most interesting that has so far been published in your idea exchange columns, as there are thousands of motorists who attempt to get along with makeshift contrivances in operating and handling their cars that prove far more expensive in the long run than similar or better devices for the same purposes can be purchased.

My car was fairly well equipped when I bought it, having a full set of tools (such as is termed standard tool equipment); headlights, tail light, hand pump, jack, top, curtains, windshield and horn. This outfit I was given to understand by the dealer was all that was necessary to insure my future convenience and welfare under all motoring conditions. He was right in so far as securing bare service from a car is concerned, but in less than a month I learned that there were numerous devices which could be purchased at a negligible cost and which not only gave manifold satisfaction in service, but served to increase my peace of mind, as well as bringing bodily comfort.

My first investment was in a tire carrier, which I installed on the rear of the car, and have since used it to keep an extra rim and inflated tire, always ready for use. Before installing this equipment I suffered many tedious delays along the road, with accompanying waste of energy and loss of temper, two effects that lessen greatly the pleasures of motoring.

Experience along the road next brought to my attention the imperative need of a set of handy wrenches, which in-

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cluded 15 different tools, designed for use on different parts of the car, and these soon demonstrated their value in lessening the labor, time and expense of making repairs, while improving the quality of the work accomplished, as well as keeping the heads of the screw nuts and bolts in good condition.

I also added to my kit a vulcanizing outfit and engine driven tire pump, both of which accessories seem so indispensable that should I ever purchase another car these would be purchased immediately, to be carried in the car. One thing I carry which might not be recommended for the average car owner is a tap and die set. This handles 16 different sizes of threads and I have often found it useful on the road in retapping or restoring threads, as well as making new pieces or parts. Such equipment would probably appeal to but few owners owing to the expense, but with me the car is a hobby and as I have no other I feel thoroughly justified in indulging in such a purchase. In fact, my tool equipment is very complete and I have been fully compensated for the expenditure it represents on many occasions by being able to make repairs and adjustments that otherwise would have been extremely difficult, if at all possible, and which in some cases would have required that the car be towed home.

From the viewpoint of comfort I have been equally indulgent, as I spend many hours in the car, using it both in business and for pleasure, so I can credit much of this expense to overhead costs. After several trials I found a very serviceable set of shock absorbers, inexpensive, and while probably not as effective as the highest priced product, they improved greatly the riding qualities of the car both on rough, rolling roads, as well as cobbled or irregular pavements, where the vibration runs up through the springs and reaches the passengers.

Last winter I installed an electric carburetor heating device which greatly improved the starting and operation of the engine and am still using this device to facilitate starting. After this has been turned on a few seconds the engine starts with the first few revolutions of the starting motor, regardless of how poor a grade of gasoline I happened to have in the tank.

My complete equipment for making road repairs and adjustments I soon learned was of little service at night, so I purchased a spot light and while this is of great service in illuminating the way for driving at night, it is detachable, so that it can be used in lighting any part of the car where work is to be done.

In looking over the accessory advertisements I have seen many other things that appear practical and useful which I will adopt in the near future. One might suppose I was a wealthy person, judging from my ideas of car equipment, but as I previously stated, besides the service rendered in my business the car is my only hobby and as I do not spend any money for golf, boating or other diversions, I intend to enjoy every convenience and satisfaction from motoring, and while the modern car comes to the owner fairly well equipped, there are hundreds of accessories on the market that do not come as standard equipment, without which the motorist does not derive all the benefits and avoid most of the unpleasant features that go with operating a car.

CARBURETOR TROUBLE.

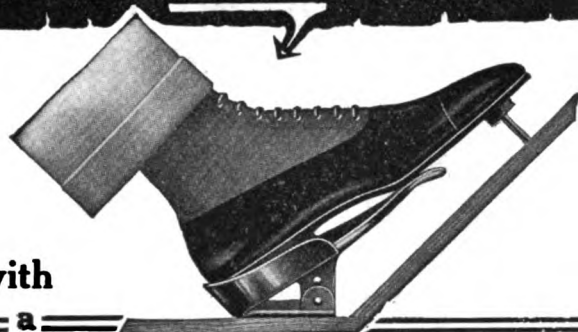
(C. B. Z., Wilmington, Del.)

I have a Chalmers car which recently has been overhauled. The carburetor does not pull as it should. It is a Rayfield carburetor. Will you please advise me through the Queries Columns of the Automobile Journal?

Suggest that you first adjust the carburetor to see if your trouble really lies there or in the engine. The low speed should be turned to the right or left until the engine runs evenly at low speed. It is best to allow the engine to become thoroughly heated, turning low speed to the left until the engine slows down, then turn to the right a notch at a time until the engine idles smoothly. Remove the hot air elbow over the main air valve, but do not move the high speed screw more than one-eighth of a turn at a time. Turn to the right for a richer mixture and to the left for a leaner mixture. This setting must determine the fuel economy, so it is

(When Writing to Advertisers, Please Mention The Automobile Journal.)

EASE THAT STRAIN



with

COMFORT FOOT REST

Give your foot the same fair chance your hands have, of being comfortable: a Comfort Foot Rest does it!

Your hands don't get tired because you can *rest* them on the wheel; but there's a lot of leg and foot strain that you've *had* to take—heretofore. The rigid position on the accelerator gives no rest.

With the Comfort Foot Rest it's different. "The Comfort pays by the foot—every single yard you travel." Insures an even flow of gas; abolishes muscle weariness.

\$2.00

Order through your dealer, or we will send you one of these foot rests upon receipt of \$2.00.

THE GENERAL APPLIANCE CO.

102 Boylston Street

Boston, Mass.



Stop !!

If you are aiming for New York why not strike the center? This is where the HERMITAGE is located.

In the middle of the Times Square district. The HERMITAGE touches elbows at once with the great amusement and business centers of the metropolis.

Room with adjoining bath \$1.50 up

Room with private bath \$2.00 up

FRANK C. HURLEY, Proprietor.

NEW DEPARTURE BALL BEARINGS



Strength
Stamina
Service



The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensee

ZENITH CARBURETOR

KNOWN the world over as the *zenith* of carburetor efficiency. A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.
New York Detroit, U.S.A. Chicago

THE MOTOR TRUCK

Published Monthly The year \$2; the copy 20c

A magazine for business men devoted to the promotion of highway haulage efficiency. It is the national authority of vehicular transportation.

AUTOMOBILE JOURNAL PUB. CO.
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The highest quality lowest priced lamp produced

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The Most Beautiful Car in America

It is a well-known fact that Paige Dealers are among the biggest money makers in the motor car field. An inspection of the Paige line will explain why.

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(When Writing to Advertisers, Please Mention The Automobile Journal.)

best to set this as lean as possible and still retain good acceleration.

As the car has just been overhauled it might be possible that it has not had sufficient time to wear in the bearings, which are probably very tight. If the magneto or distributor are set late it will also cause a loss of power. This condition will not allow a knock in the engine with the spark advanced on a hard pull. A rich mixture will not overheat the engine, but the exhaust manifold will become hotter.

REPAIRING INNER TUBE.

(J. D. R., New York City, N. Y.)

Kindly advise me how to do a good job of inner tube repairing where the hole is larger than a small puncture. I have done quite a lot of this work, but am not yet satisfied with the patching.

Trim the ragged edges of the rubber with a pair of shears. Wash out the inside of the tube around the cut with a piece of cloth dampened in gasoline, then apply a coat of vulcanizing cement to the cleaned parts and allow them to dry thoroughly.

Cut out a piece of cured back rubber about three-quarters of an inch larger than the hole and moisten it with gasoline and place it inside the tube, with the uncured side of the patch towards the hole. Fill up the cavity with repair gum and with a sharp knife trim the rough edges flush with the surface of the tube, after which it may be smoothed or washed with gasoline. Dust the new gum with soap stone and place in the vulcanizer. When the tube is removed from the vulcanizer dip the repair in water, as this will bring out the bloom.

LOCATING SHORT CIRCUITS.

(E. L. M., Portland, Me.)

I have a short circuit somewhere in the wiring of my car that I cannot find. Will you please advise how to locate this trouble?

A short circuit means that there are two wires of opposite polarity in metallic contact. Under these conditions the battery will be partly or completely discharged and, of course, dim lights or no lights will be the result. A short circuit may occur at any point in the wiring system, but is most usually found at a connection or switch terminal and is caused by frayed ends of the wires bridging across the terminals. A double ground is that each wire of opposite polarity is in metallic contact with the frame of the machine. The ammeter shows whether or not the short circuit exists in any part of the wiring except the battery to the switch bar, and in the starting motor circuit.

Examine carefully every inch of the conductor wires connecting at one end of the battery terminals and the other end to the bus bars of the lighting switch. Be certain that the insulation is perfect and not cut through. If the battery has been discharged have it recharged. In replacing the battery be certain that the proper wires are connected with the positive and negative terminals of the battery.

RADIATOR OF PACKARD TWIN SIX.

(S. I. D., Newark, N. J.)

The radiator of my new Packard Twin Six overflows when it seems to be full, but after running a short distance the water level appears to have gone down. Can you advise me the reason of this?

Your trouble is evidently due to the fact that you do not understand the working of the thermostat that is attached to the lower side of the pump housing. This device prevents the water from circulating through the radiator until it has reached the proper temperature for efficient operation. When the water in the cooling system is cold the circulation from the pump is through the cylinder blocks and back to the pump through the bypass manifold at the rear of the cylinders. As the water warms up the expansion of the thermostat, caused by the heat, actuates a lever in the thermostat housing, automatically closing a valve in the inlet passage from the rear cylinder block manifold, and at the same time opening the valve in the passage leading from the bottom

tank of the radiator. This allows the water to circulate through the radiator to facilitate keeping it at a predetermined temperature. In filling the radiator when the engine is cold the valve in the thermostat housing will be closed. This necessitates letting the water in the radiator slowly, otherwise, it may overflow before the cylinder jackets are filled. The capacity of the cooling system is about eight and one-half gallons.

MAGNETO TROUBLE ON MAXWELL. (J. R. H., Woonsocket, R. I.)

My Maxwell has a bad habit of going dead in the magneto. I have had the car towed and after letting it into first speed it churns for quite a while and afterwards will pick up on one cylinder, and finally hit upon all four, but again goes dead when I want to start it in the morning. Can you advise me through the query column of the Auto Journal how to remedy this?

This form of magneto uses plain bearings that require considerable lubrication. It may be possible for the brushes or armature winding to become oil soaked, which, of course, would interfere with the proper delivery of current. It is also important to time the magneto so that the contact points of the igniter plate in the cylinder will separate when the armature of the magneto has attained its proper position of maximum current generation. The failure to deliver current is most usually due to poor contact, which would deliver a poor current at these points. Particles of foreign substance, or perhaps the elastic inability of the springs holding the parts in contact may cause this trouble. If the trouble is gummed oil adhering to these parts, it may easily be removed by washing them in gasoline. Ignition troubles often result from defective wiring and loose connections.

SULPHATION IN STORAGE BATTERY. (G. I., Dover, N. H.)

Would you please advise me if there is any way to make sulphated negative plates fit for service after they have been exposed to the air? Is there any way to make positive plates from sheet lead? Why is a carburetor mounted closer to one cylinder than the other in a double opposed engine? Would it not be better to connect the carburetor with the middle of the intake pipe? When cleaning carbon with oxygen does the tip direct the oxygen to all parts of the cylinder, or does it spread around after it enters the combustion chamber? What method can be used to keep the flame from hitting the spark plug threads?

Whether negative plates of a storage battery may be again made fit for service after becoming sulphated depends entirely upon the extent of the sulphation. For ordinary sulphation a recharge of the battery is usually sufficient if continued long enough. When the sulphation has progressed so far as to clog the pores and cover the surface of the plate, rejuvenation is accomplished by charging the battery, removing the negative elements and placing them in a bath of sulphuric acid as cold as possible and having a density of 1.240. They are connected as anodes (positive), or in a reverse manner to that in which they are normally connected.

As cathodes (negative), "dummy" plates of plain sheet lead about 1/16 of an inch thick are used. On passing current through the plates the sponge lead is converted into lead peroxide. When the active material is completely peroxidized, the current is again reversed, the acid in the bath being first removed and fresh acid substituted in order that the impurities may not be deposited on the negative plates. When the elements are finally converted back into sponge lead and reassembled with the positives the capacity and activity of the battery are increased. If the sulphating action has gone so far as to form a layer between the grid and the active material the plates are usually not reduceable, and must be renewed and replaced by others.

There is no practical way of making positive plates from sheet lead. The making of storage battery plates requires machinery, experience and skill, and even if plates could be made by one the cost would be considerably greater than those made by the factory.

The carburetor connection and its location on a double

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Will buy a complete, practical system that any one can operate and which contains all forms needed for one year.

THE SYSTEM INCLUDES:

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From these data, operating costs and earnings can be obtained in a few moments. Any clerk can keep the records of one or 100 trucks.

MOTOR TRUCK

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MINUTE DEMOUNTABLE WHEEL

for Ford Cars

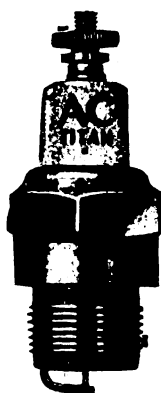
It's the biggest seller of the year, because it fills the greatest need.

Changes a tire in 60 seconds. One nut to unscrew that's all you do.

Retail Price - - \$30
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Reg. 1/8-inch
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Albert Champion Means AC Spark Plugs

The Standard Spark Plug of America

LOOK FOR AC ON THE PORCELAIN

PERFORMANCES, not claims, are what count. AC is exclusive equipment on NINETY makes. There is an AC for every type of motor.

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STA-TITE Piston Rings

Play an Important Part in the Success of America's Leading Automobiles, Motor Trucks and Tractors.

Every automobile engineer will tell you that the Life, Power, Speed, Hill Climbing Ability and Operating Cost of a gasoline driven vehicle depends on its motor.

The strength and power of any motor depends largely on its compression. Perfect Compression means an efficient, clean, smooth running motor.

A motor without perfect compression is troubled with improper lubrication, lack of power, and an accumulation of carbon.

STA-TITE RINGS give Perfect Compression and overcome these troubles—besides saving on oil, gasoline and repair bills.

STA-TITE RINGS insure proper lubrication and prevent pistons from wearing dry and scoring cylinder.

STA-TITE RINGS are guaranteed to be leak proof.

Dealers You should sell STA-TITE RINGS. The three piece construction assures equal distribution of pressure on cylinder walls.

Remember—STA-TITE RINGS are manufactured by the largest manufacturers of piston rings in the world.

Send NOW—TO-DAY for "TWELVE REASONS" why STA-TITE RINGS will prove to be business builders.



110 Sanford St.

Muskegon, Mich.

Makers Also of "Quality" Snap Rings

opposed engine is merely a matter of convenience and accessibility and under ordinary conditions and present construction the gas mixture is not affected by this construction. The location of the carburetor in the middle of the intake pipe, or half way between the cylinders, would not make any material difference.

In cleaning the carbon from an engine by the oxygen method the oxygen is carried into the cylinder by a flexible copper tube, which should be moved around the cylinder in all directions. This tube prevents the oxygen from touching the spark plug threads. Though the action is somewhat different the flame resulting from the burning of the carbon in the oxygen from the tip is practically the same and is the same distance from the tip as is the flame from an illuminating gas jet. The oxygen gas itself does not burn. The burning is the result of the rapid oxidization of the oil from the carbon deposit. As this proceeds the oil is entirely oxidized and the carbon peels off the cylinder and piston and is blown out of the cylinder chamber. If you have never used the oxygen method of carbon burning, it is best to get an old cylinder and make a number of trials. Be sure that you fully understand the action of oxygen and the effects. Do you know that steel or iron will burn freely in oxygen?

It is a school experiment to fill a bottle with oxygen, put some sulphur on a steel wire and dip it into the bottle and the wire will burn brilliantly. Such might be the effect of oxygen in the cylinders of the engine if the oxygen pressure was too great. Before beginning the operation the piston in the cylinder should be at the top of its stroke. Do not concentrate the jet too long in one place. Be sure that the water jackets are filled with water and avoid heating the block.

CARBON TROUBLE.

(G. H., Somerville, Mass.)

For quite a time my car has been giving me considerable trouble, due to carbon deposits in the cylinders. The trouble seems to be general. By this I mean all cylinders are affected. I have installed leak proof rings and have had the pistons grooved and bored with drain holes to stop all possible oil leakage, but the trouble still persists. Can you help me with this matter?

You are not alone in your trouble for we have many queries from our subscribers on the same trouble. The carbon evil seems to be increasing rapidly and which we think is due to the present low grade of fuel. By low grade we mean the low test fuel which approaches kerosene to a certain extent.

As this low test fuel is used vaporization is not as complete as with gasoline, the result being that liquid kerosene is introduced into the combustion chambers. This liquid kerosene cuts the lubricating oil and soon finds its way into the base, diluting the lubricant to the extent that the oil becomes thinner and works into the explosion chamber, where it carbonizes. Frequent draining of the oiling system is necessary for this trouble.

Kerosene or low test fuel is rich in carbon. The proportion of air to vapor when kerosene is used is different than when gasoline is used. For this reason imperfect combustion results and carbon is deposited upon the explosion chamber.

Special manifolds and vaporizing devices now on the market are designed to make the burning of kerosene or low test gasoline possible and nearly all of them make use of the exhaust heat for vaporization of the fuel. The manufacturers claim that less carbon is formed when such devices are used.

Another method of keeping down carbon formation is to introduce a certain amount of water vapor or steam into the cylinders, together with the fuel. Experiments have proved that water vapor will crack off carbon from iron if sufficiently heated.

Either the installation of a special fuel vaporizing attachment or water vaporizing device is to be recommended if one is troubled with carbon. In every case the engine and manifold design plays an important part in satisfactory operation, so that a device which might give good results on one type of car might not work on another make.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

TROUBLE WITH CHANDLER CAR.

(A. N. S., Rochester, N. Y.)

I have a 1915 Chandler car which was used by a salesman of the local Chandler agency as a demonstrating car and had been driven about 5000 miles at the time I purchased it. I was informed that the car had been thoroughly overhauled, new pistons and rings put in and that the engine was in absolutely first class condition.

After driving the car about 500 miles I noticed the gradual development of a slapping noise in the engine. I tried using a heavier body of oil, which helped for a little while, but now it doesn't make any difference whether the oil is light or heavy. The noise is more pronounced when the engine is running slow, although it is very plainly heard at any speed and does not sound louder if the engine is pulling hard or easy or if the spark is fully advanced or at full retard. When the bearings are tightened the noise is subdued until the engine gets limbered up again and then it is as bad as ever. The only reason I can account for this is that the crankshaft bearing on one of the connecting rods is out of alignment. When the bearing is tight everything is all right until it is limbered up and then it gets a side slap on the crankshaft. By using a tin can screwed on a dowel and putting my ear tight to the can, the noise sounds loudest in the third cylinder. I put in a new valve, push rods, etc., but this doesn't seem to help any.

Please advise me if the above condition would cause the trouble and if the bearing could be lined up by using a piece of tissue paper between the connecting rod and babbit about one-third the width of the bearing so that it will tilt the connecting rod one way or the other as the case may be.

Would you advise running the engine slowly for a short time with the lower part of the crank case removed to see if anything can be detected and if the trouble seems to be with the connecting rod; disconnect and remove same to see if that eliminates the trouble?

Please advise as to how tight the different bearings should be adjusted and in what way it can be determined that an even bearing is obtained. Also can the connecting rod bearings be adjusted on the crankshaft without removing the cylinders?

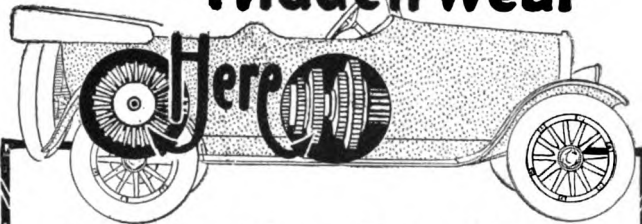
The connecting rods may be tested for play by removing the crank case and attaching the starting crank. Have some one move it back and forth while you are listening at the base of the block for any sounds that might cause this condition. The cylinders will act as a sounding chamber for this operation.

If the main bearings have been pounded or burnt out they will have to be scraped about .010 of an inch from the top of the bearing and this should be dropped down the thickness of shim placed behind it equal to the amount scraped off. If this was not done the crankshaft would not line up properly with the main drive gear in the transmission. All nuts and bolts should be carefully replaced and tightened uniformly. After inspection of the connecting rods it will be noted upon removal of the cap that laminated shims separate cap from the rod. These shims consist of a number of thin stampings about .002 of an inch thick and are so designed that two, three or any number desired may be removed according to the take up necessary. The bearings may also need scraping and extreme care should be taken with this process. The fillets of the bearing should be well cut away, as if this is not done a proper bearing cannot be obtained in the centre. After the rod bearings are scraped the connecting rods should be lined up because if the rod is but slightly sprung it will tend to throw the wristpin end of the rod against the piston boss. The connecting rod bearing on the crank pin end should have a side play not less than .002 of an inch. If you have not a lining jig, a piece of stock the size of the crank pin can be used.

When the bearings are scraped the connecting rod is set upon this, a combination square rested upon the stock and a rule set against the side of the piston and the rod sprung until the rule touches the entire length of the piston skirt. This will do a fairly good job of lining and while it is not exactly accurate, it is better than not lining them at all.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Avoid Hidden Wear



Out of Sight—Out of Mind

THE Differentials and Transmissions are out of sight, but these gears work hard and require the best possible protection from frictional wear. If you wait until they become noisy you have allowed serious wear already.

The ideal lubricant for these gears is "K00 special" grade of



—it follows the gears, cushioning them always from abrasion—but unlike grease it will not melt and run out in summer or thicken in winter.

NON-FLUID OIL is produced from the finest Pennsylvania crude, made adhesive by means of our exclusive process and has none of the non-lubricating fillers used to "body" common grease.

Almost every dealer has NON-FLUID OIL in orange cans.

"K00 special" grade for gears;
"K000" for bearings and differentials that are not oil tight.

The New York and New Jersey Lubricant Co.

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The AUTOMOBILE JOURNAL

Is the oldest Automobile magazine published in America devoted wholly to the owners of passenger cars.

A quality magazine with prestige and circulation that brings results to advertisers.

TIMES BUILDING
PAWTUCKET, R. I.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUG. 24, 1912, OF

AUTOMOBILE JOURNAL,
PUBLISHED SEMI-MONTHLY AT PAWTUCKET, R. I.
For April 1, 1918.

State of Rhode Island, County of Providence.

Before me, a Notary Public, in and for the state and county aforesaid, personally appeared William H. Black, who, having been duly sworn according to law, deposes and says that he is one of the owners of the Automobile Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the act of Aug. 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:

PUBLISHER, W. H. & D. O. Black, Jr., Pawtucket, R. I.
EDITOR, E. K. BROWN, Providence, R. I.
BUSINESS MANAGER, W. H. Black, Pawtucket, R. I.

2. That the owners are:

W. H. BLACK, Pawtucket, R. I.
D. O. BLACK, JR., Pawtucket, R. I.

3. That the known bondholders, mortgagees and other security holders owning or holding one per cent. or more of total amount of bonds, mortgages or other securities are:

M. J. BLACK, Mortgagee, Pawtucket, R. I.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

(Signed) WILLIAM H. BLACK, Co-Partner.

Sworn to and subscribed before me this 4th day of April, 1918.

(Signed) THOMAS BESWICK, Notary Public.
(Seal) (My commission expires June 30, 1920.)

MAGNETO AND DYNAMO.

(P. O., El Paso, Texas.)

Could you please tell me the difference between a magneto and a dynamo such as is used for charging a storage battery? Can a magneto be used for charging a battery and is it as dependable as a dynamo? What provision is made for controlling the current from a magneto? Is the current from a magneto always alternating?

The magneto is a small dynamo, generating alternating current. Magnets are of two classes, the low and the high-tension magneto. The high-tension is practically a low-tension fitted with a secondary winding or coil, which transforms the current to a higher voltage in order that it may be of high enough tension to enable the spark gap to be jumped. There is no current controlling device on a magneto and the current is variable as regarding both the voltage and amperage, depending upon the speed of the armature. A magneto could not be used by itself for charging a storage battery.

A dynamo generator, such as is used for charging a storage battery, is equipped with a voltage regulating device and a cut out, that is so arranged as to disconnect the line when the generated current falls below a certain point. Such a device is necessary or the battery current would run back through the dynamo as soon as the generated current fell below the battery current. The voltage regulating device is so designed as to prevent the generation of excess current, such as would result from excessive armature speeds. In order to use the current from the magneto for charging a storage battery it would be necessary to rectify or change it to direct, then provide some means of controlling the voltage.

LUBRICATING TRANSMISSION.

(C. H., Providence, R. I.)

I own a Ford touring car 1913. The transmission is noisy when used in low or reverse. A friend advises me to use a heavy grade of grease, as he claims it will result in quieter running.

While this advice might well be applied to some types of cars, it would not do on the Ford, as the transmission is lubricated by the oil from the engine.

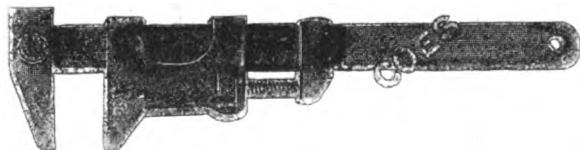
The oil in the crank case and flywheel housing is thrown by centrifugal action into a funnel-shaped tube in the housing of the flywheel. From here the oil is carried by a tube to the front of the engine, where it is fed into a splash pan that is located beneath the connecting rods and into which the connecting rods dip as the crankshaft revolves, thus throwing the oil to all parts of the engine, such as camshaft, wristpins and cylinders. The oil from the flywheel case also lubricates the transmission. The effect of heavy grease on this lubricating system is apparent. It would most likely result in entire disarrangement of the flow of oil and might possibly ruin the engine.

(Continued from Page 23.)

or fall out, as they can be badly damaged by so doing. After this has been done the spring and sleeve can be removed with the piston.

Upon reassembly of these various parts, together with the new metering pin, be sure to wipe the cylinder and piston thoroughly clean to remove all dirt and grit that may have been deposited. Be sure that the by-pass hole through the piston is directly in line with the metering pin, for should this not line up properly the injection feature will be lost and good results cannot be obtained from the carburetor. After the reassembling is complete, push the valve cone all the way down to determine if the lower air valve is in the proper position. It should be wide open.

The ignition system requires practically no attention, but as it is one of the most important parts of the car, it should be inspected at this time. See that the timing contacts have the proper break, which should be 18 thousands of an inch. There is a gauge on the distributor wrench that is marked "distributor." The rotor button should work freely in the rotor. Look at the spring which holds the bottom against the rotor track and see that the button is not subjected to any undue pressure. The distributor head should be cleaned and lubricated.



Ask For The Best Wrench

Your dealer will show you just the size you need for your tool kit, or for repair work.

He will recommend the COES wrenches as all good dealers have done for fifty years.

Coes Wrenches do not break, or wear out in service life, they cost less than any other tool made.

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Packard Twin Six
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General Chassis Overhaul
Oldsmobile, 44-45
Chalmers
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Annual Overhaul Review

AUTOMOBILE JOURNAL

May 25th Issue

The most comprehensive presentation of information dealing with the overhaul and restoration of models of popular passenger cars ever compiled.

Every article complete, detailing with the mechanical attention necessary to make these machines thoroughly efficient and dependably serviceable.

All suggestions have been approved by practical men. A number of the greatest value to OWNERS of used cars, DEALERS and REPAIRERS.

This edition will be a wonderful medium for publicity for the manufacturers of parts and equipment included in or that may be utilized with the cars specified. The obvious reasons for specific advertising in this number cannot be too strongly emphasized.

It will be the opportunity of the year. Reserve space by wire or letter. This will insure representation.

Last form closes May 20.

AUTOMOBILE JOURNAL

Times Building

Pawtucket, R. I.

POLARINE



Make Motor Economy A Fact

In spite of the higher cost of cars and repair parts—in spite of the scarcity and higher charges of skilled mechanics—you can maintain your car in good condition economically, if you stick to Polarine for lubrication.

Polarine overcomes friction and prevents carbon troubles. It lengthens your motor's useful life and keeps it in prime condition the year round.

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STANDARD OIL COMPANY OF NEW YORK

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AUTOMOBILE JOURNAL

DEVOTED TO

OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS

VOL. LXV.

PAWTUCKET, R. I., MAY 25, 1918.

NO. 8.



Look for this silent salesman on your tire dealer's counter—and learn

The “WHY” of the Hood “EXTRA” Ply PART II.

As the Hood Dealer shows you the construction of a Hood Tire you will notice that each ply of fabric is cushioned from the next ply by a liberal cushion of rubber—pure rubber and sulphur—not a compounded mixture.

The plies cannot chafe, therefore cannot heat and separate. This means longer life—less tire trouble, in addition to the 25% to 35% excess strength the “extra” ply gives you in Hood Tires.

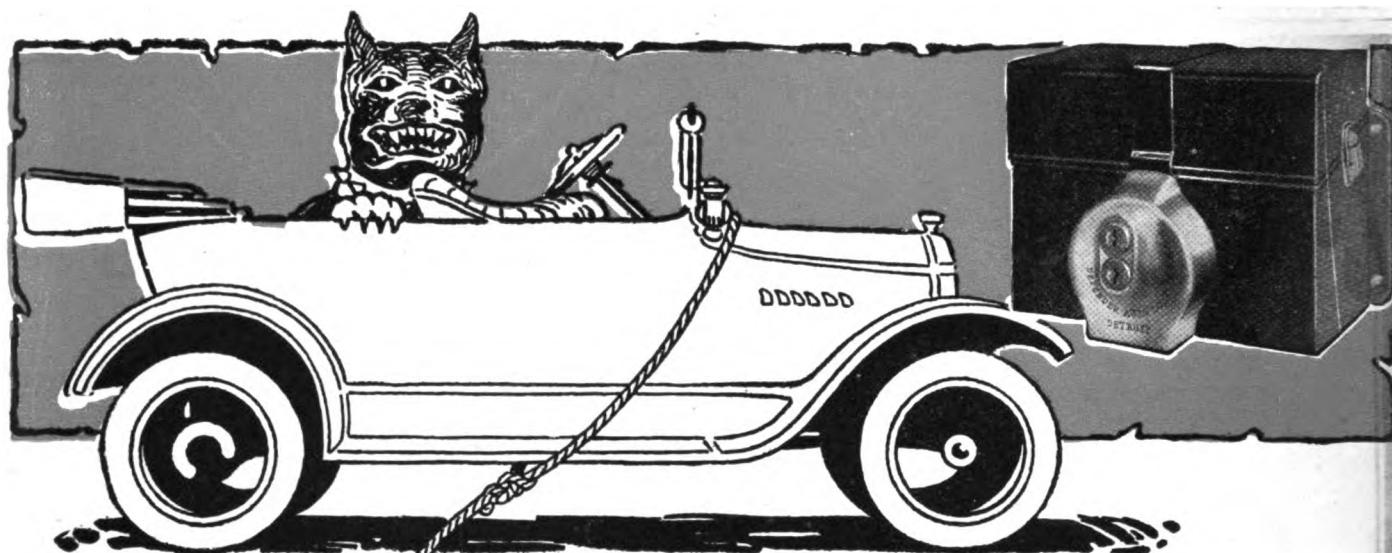
We also waterproof this compact extra strength carcass and double cure the tire, a sure guarantee against fabric buckles and pinches, insuring a perfect carcass.

Don't forget—the carcass is *the strength* of the tire.

These are some more reasons why Hood Arrow Tread Tires, with their extra ply, excel in mileage at low cost.

If you do not find a Hood Dealer near you, look for him on the page opposite the contents page of the 1918 Blue Book. The Hood Dealer is somewhere near you. Or, write us.

HOOD TIRE COMPANY, Inc.
Watertown, Mass.



Fords are securely anchored with DEFENDER Auto Lock

Positive assurance that his Ford will remain unmolested by thieves and will BE THERE when he returns is what the Ford owner gets when he puts on a DEFENDER AUTO-LOCK. His car is safely anchored—no amount of pilfering can overcome the locking qualities of the DEFENDER AUTO-LOCK—they lock the ignition box and safely guard your coil units also.

Cost—\$4.00
Worth—the
price of the car!

DEALERS PREFER TO SELL THE BEST

That's why DEFENDER AUTO-LOCKS are sold by thousands of dealers from coast to coast—they realize that the DEFENDER AUTO-LOCK will perform its duty and stand guard over their customer's car.

How many times have motorists said—"I must get a lock for my Ford" and neglected to do so until their car was stolen. A \$4.00 DEFENDER AUTO-LOCK would have saved them this several hundred dollar loss. A DEFENDER AUTO-LOCK is worth just as much as your customer's car for it will save him that loss. The grounding device which prevents tampering with the ignition and starting car without the use of switch is an exclusive feature of the Defender.

WHY NOT recommend and sell the best—the DEFENDER AUTO-LOCK

DEFENDER AUTO-LOCK CO.
5th Floor Marquette Bldg. Detroit, Mich.

Canadian Gen'l Electric Co., Limited, of Toronto, Sole Distributors for Canada.



What More Could You Ask Than This— Mr. Dealer?

Michelin offers you tires which for 23 years have been recognized as unsurpassed for durability. These tires sell at prices little higher than the cheapest makes and far lower than others of anything like equal quality.

Years of big, national advertising have given prestige and saleability to these high-quality, reasonably-priced tires; and now an additional, concentrated New England drive is starting exclusively for the benefit of New England dealers.

What more could you ask?

Write or wire for particulars.



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31x4	.. 5.00 up	36x4 1/2	.. 8.00 up
32x3 1/2	.. 5.00 up	37x4 1/2	.. 8.00 up
32x4	.. 6.50 up	35x5	.. 8.50 up
33x4	.. 6.50 up	36x5	.. 9.00 up
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34x3 1/2 14.85 3.25	35x4 1/2 22.75 4.45
31x4 16.45 3.45	36x4 1/2 23.85 4.65
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32x3 1/2	S. S. 14.00		3.85	36x4 1/2	S. S. 25.55		6.65
31x4	Q. D. 16.00		4.75	37x4 1/2	S. S. 26.00		6.90
32x4	S. S. 16.50		4.95	35x5	S. S. 28.00		7.90
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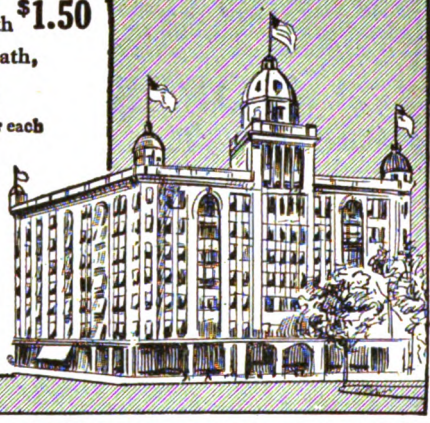
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34x4	tire	9.50

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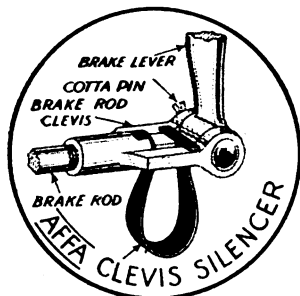


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They stop the rattle and stop it right—
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30x3 .. 2.85 & up	32x4 1/2 .. 8.00 & up
30x3 1/2 .. 3.95 & up	34x4 1/2 .. 8.00 & up
32x3 1/2 .. 5.00 & up	35x4 1/2 .. 8.00 & up
34x3 1/2 .. 6.00 & up	36x4 1/2 .. 8.00 & up
31x4 .. 5.00 & up	37x4 1/2 .. 8.50 & up
32x4 .. 5.50 & up	35x5 .. 9.00 & up
33x4 .. 6.50 & up	36x5 .. 9.00 & up
34x4 .. 6.00 & up	37x5 .. 9.00 & up
35x4 .. 7.00 & up	38x5 1/2 .. 12.50 & up

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VOL. LXV.

MAY 25, 1918.

NO. 8.

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Treasurer . . WILLIAM H. BLACK

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Published the 10th and
25th of each month by the

AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

THE Twelfth Annual Touring Number of the Automobile Journal, which will be published on July 10th, will contain itineraries of many new routes and the latest touring information, and will also have as an exceptional feature directions for reaching all the great National Army Cantonments, which, of course, are the all absorbing spots of interest in this country for motorists for the duration of the war. The location of these cantonments will be indicated on the master map, while individual maps will show the road connections with the principal transcontinental routes and the meridional highways, enabling one to map out a tour to any of the cantonments with little trouble. As in past years the book will teem with information and data covering practically all the sections of interest in the United States, giving itineraries of the routes to various points, as well as photographs of scenic features and points of historic interest. This feature number of the Automobile Journal has met with a more popular demand than any similar publication, as it is the most complete touring guide published under one cover, that is brought up-to-date each year, and each edition has been over-sold. The success of the number has been due to the style in which the touring data is presented to the reader, being arranged in a most understandable form that has been developed from correspondence with tourists for over a decade. New England, which is looked upon as America's great summer touring grounds, is the subject of several special touring articles, accompanied by maps and itineraries showing practically all the principal highways and connecting routes throughout the section, together with illustrations of the most notable places and points of interest, where vacationists find the most comforts and conveniences.

ELSEWHERE in this issue there is a statement by Major Mark L. Ireland, Quartermaster Corps, U. S. A., setting forth the great need of motor mechanics in government service at present. The education and training of men for this class of service with the army is one of the principle factors of the shops located at Fort Sam Houston, Texas. Adequate instruction is given the men to qualify for service with mechanical units for service in this country and abroad. A large percentage of Americans in this section of the country are somewhat surprised to know that such an organization exists at Fort Sam Houston, where men are daily being received for training in the particular duties connected with motors and motor transportation. There exists at this time urgent need of men who have experience in the following trades: Auto repairer, battery repair men, auto repair mechanic helper, inspector of motor vehicles, machine tool inspector, machinist, machinist's helper, magneto repairer, mechanical engineer, mechanical auto repairer, tire repairer, tool maker and trimmer on automobiles. It is understood on good authority that the opportunities open for civilians at the Fort Sam Houston shops are of an exceptional character. Any man, whether within the draft age, or otherwise, who has had experience along the lines above indicated, is requested to write without delay to the commanding officer of Quartermaster Mechanical Repair Shop No. 304, Fort Sam Houston, Texas, who will furnish full particulars concerning pay, government allowances, and other subject matter, indicating opportunities that are open to men possessing qualifications making them desirable for duty with this organization.

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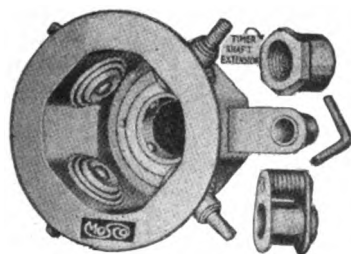
This tool differs radically from others in several respects. It is really more of a machine than a hand tool, as it renders valve grinding an accurate mechanical operation rather than a guesswork hand job.

It has been found that a much more rapid motion can be obtained with the Mosco Grinder than with the ordinary tool, resulting in a very superior finish on the seats.

The device is made of the best materials and is thoroughly guaranteed in every respect. At the low price at which it is listed there should be one in every kit, when it is considered that it is offered not only as a tool, but as a QUICKER, SAFER and BETTER METHOD of valve grinding.

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Cheapest in the long run.

All wearing parts renewed at cost of 27c.

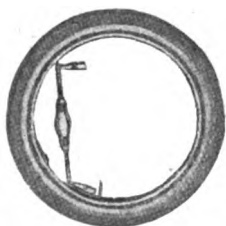
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Longer Life. No Fibre Ring to Wear Humpy.

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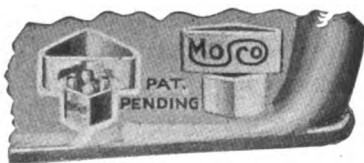


Mosco Tire Rim Tool

Provides a quicker and easier method of changing tires.

Price \$2.50 Each

Mosco Socket Nut and Bolt Holder For Ford Car



Position on Crank Case Bolts.

engage wall of crank or transmission case and prevent nut or bolt head from turning while the man underneath the car unscrews the bolts.

PRICE, 15c EACH.

A REAL TIME SAVING DEVICE.

Simply slip MOSCO Nut and Bolt Holder over the top of each Engine or Transmission nut or bolt head. The wings protruding above the hex socket

MOSCO Floating Plunger Wheel Puller

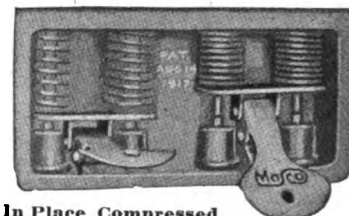


Starts a "Frozen" or "Stuck" wheel instantly. Strike the plunger; turn the screw, strike again and the wheel comes off without injury to hub-threads, spokes or axle.

Made for 200 models of 40 popular cars.

Mosco Valve Spring Compressor For Ford Car

Place the compressor in position as shown on left hand of illustration, pushing it back against cylinder wall, and making sure that tongue which hangs down is over the edge and resting in channel, then push down on handle as far as it will go. This compresses two valve springs at one operation and permits removing of pins. Should the pins be crosswise turn valve around until they are in position to pass through slots in compressor. After grinding valves reverse above operation.

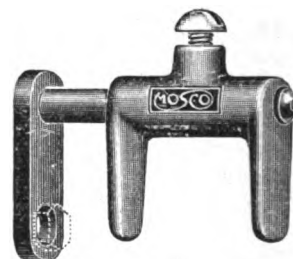


In Place Compressed

PRICE 50c EACH.

Mosco No. 500 Fan Belt Guide for Ford Cars

A safeguard against the familiar trouble of belt slipping on greasy fan pulleys. Attached to side of timer gear housing without extra hole or bolt.



PRICE 25c EACH.

Mosco No. 200 Timer For Ford Car

Made of extra heavy pressed steel. Gray bone fibre is used for raceway, with steel inserts dovetailed in and all lathe finished to a polished surface. The threaded terminals are insulated by fibre washers all the way through to contact points, thus removing cause of short circuiting common to this style of Timer. Oiler can be opened with tip of oil can, is self-closing and dust-proof. Brush assembly has die cast rotor, laminated pressed steel arm, and compression spring between roller and rotor.



Patent Oct. 31, 1916.

Price, complete with brush, Hex terminals, pin and collar, \$1.50 each.

The "Mosco" Trade Mark is Your Guarantee of Quality

Motor Specialties Company, :: Waltham, Mass.



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DELION

Highest Grade
Lowest Cost Per Mile

Tires



"Inspection"—the great word in efficiency—taking nothing for granted—expert supervision that tolerates but one quality—*Perfection*.

The Certified Tire

The Serial Number on a Delion Tire is the Certificate of Unqualified Guarantee for 6000 miles of road service—attested to and certified by as able a corps of tire makers, inspectors and rubber experts as the country can boast of.

Every Delion Tire is a Certified Tire—a tire that is in honor-bound to maintain a nationally famed reputation for high mileage.

GUARANTEED 6000 MILES

The very Delion Tire that you will buy must shoulder the full brunt of that responsibility—and after it has given you 6000 miles of road service—while it has fulfilled its promise—yet to be a real Delion from "Off the Old Block" it has got to go better than that.



HARRY M. O'BRIEN

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MOTOR OILS GEAR OILS



High Quality Means Greatest Economy

Greater mileage and increased engine power, prolonged car service life, decreased maintenance and upkeep cost, and far more pleasure without the annoyances and inconvenience of inefficient engine operation, are the direct results obtaining from the use of guaranteed EAGLEINE MOTOR OILS.

These lubricants insure the highest efficiency for thousands of miles with no other attention than replenishment and carbonization is negligible.

Eagleine Quality

Has been proven by service tests for nearly 20 years. It is recognized as the standard of engine lubricants. It is assured to buyers by trade marked sealed containers.

Eagleine Gear Oil

Prepared for use in transmission and differential gearsets, has equal quality, as well established and recognized, and minimizes repair and upkeep expense, as well as affording maximum efficiency.

EAGLE OIL AND SUPPLY CO.

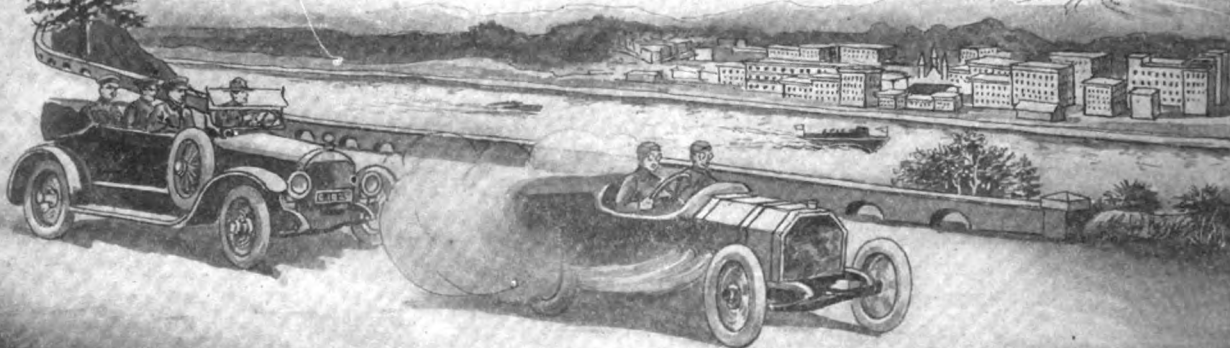
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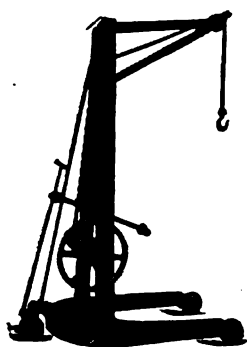
EAGLEINE MOTOR OILS-EAGLEINE GEAR OILS



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Make Your Shop a Money Maker

WITH MANLEY EQUIPMENT



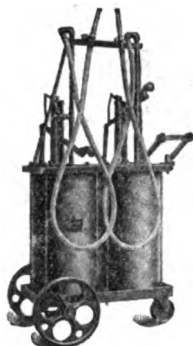
**Manley
Portable Crane**

A portable crane with a high lift and deep overhang is necessary if repair shop work is to be done economically and well. A Manley crane is as handy as a monkey wrench and as dependable as a vise.

There is continuous use in every garage shop for a Manley crane in removing, replacing and lifting engines, transmissions, front and rear axles, bodies, etc., and transporting them to various places in the shop.

Manley cranes can be had in three capacities, with lifts varying from 6 feet 6 inches to 9 feet 6 inches; overhang ranging from 32 to 36 inches. Every crane is built with cast iron base and steel superstructure—heavy at the base for stability and strong above for capacity.

The Manley crane will make money for you by saving it for you in every day's work.

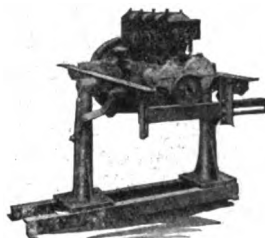


**Manley
Oil Service**

A Manley Oil Service is perfection in serving oil. It does away with the old style dabbling methods of serving oil with a measure. The Manley oil service will show your customers that you are up-to-date, show them the true measure of what you sell them, save you waste and muss, save you time and trouble and at once put this part of your business on a business like basis.

Nowadays you would not think of filling a gasoline tank with a can—then why have your oil service on such a basis?

Manley oil service can be had in one, two and three tank sizes, each tank holding 12 gallons of oil. Pumps are self measuring.



**Manley
Engine Stand**

The Manley Engine Stand is an everyday money maker for the shop that overhauls engines. Instead of having your men spend whole days in crawling under, over and around an engine to get at some part to repair it, you can have them do the same work in half the time with a Manley Engine Stand.

The Manley is quickly adjustable to take any standard engine. Built in two sizes—stationary or portable, also a special stand made for Ford motors.

The Manley stand pays for itself in what it saves—why pay for one and not have it? Get a Manley and make more money.



**Manley
22 Ton Press**

Manley presses are designed to handle all jobs in garage work where a press is needed—not merely the easy ones.

In working with press fits the Manley press will handle anything that comes along. It has two speeds and two leverages—light pressure work (1000 to 1) handled at high speed, heavy pressure (2200-5000 to 1) work at ordinary speeds. When this tremendous pressure fails, a blow with a sledge on the screw does the work—screw designed to permit this.

The Manley press will straighten frames, axles, shafts, anything. Universal size takes any work up to 42 inch width. Tables instantly adjustable on pins. Four sizes to choose from. 26½ inch width, 32½ inch width, 42 inch width and 18½ auto bench size, which is made for attaching to bench.

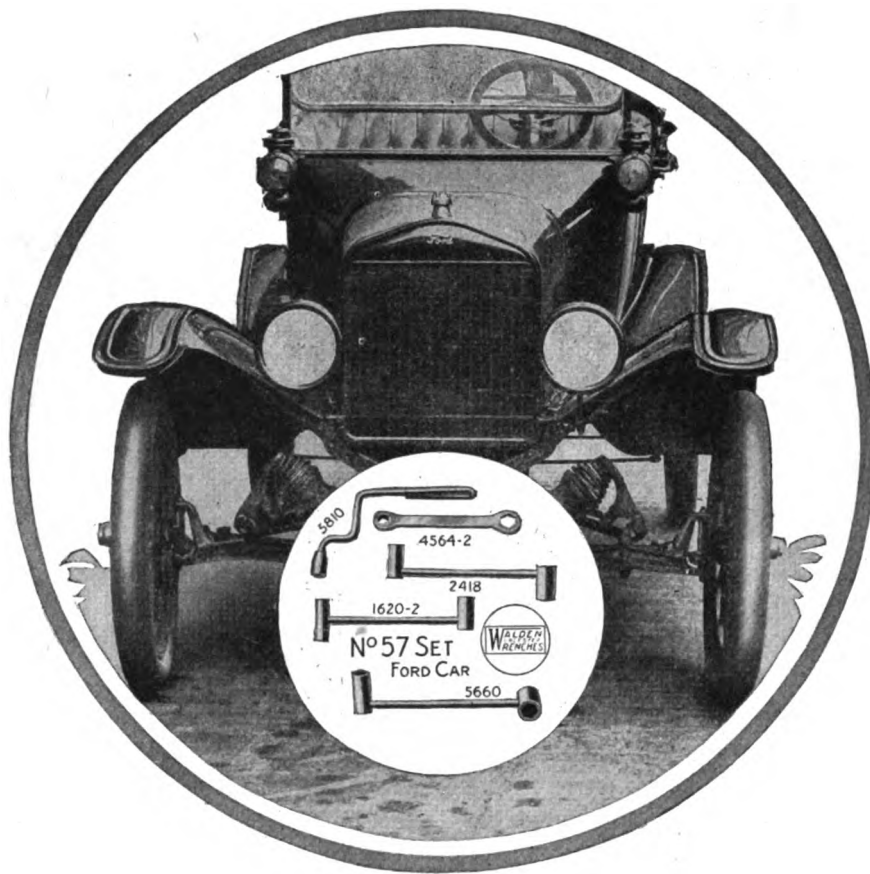
A Manley press will make dollars for you in making hard jobs easy.

United Engine & Mfg. Co.
HANOVER, PA.



**Pioneer and Largest Manufacturers
of Heavy Garage Equipment—Today
The Recognized Standard**

(When Writing to Advertisers, Please Mention The Automobile Journal.)



SPECIAL SETS DESIGNED FOR

Ford—Dodge—Overland—Buick—Maxwell—Chevrolet—Dort Cars

COMPLETE LINE OF

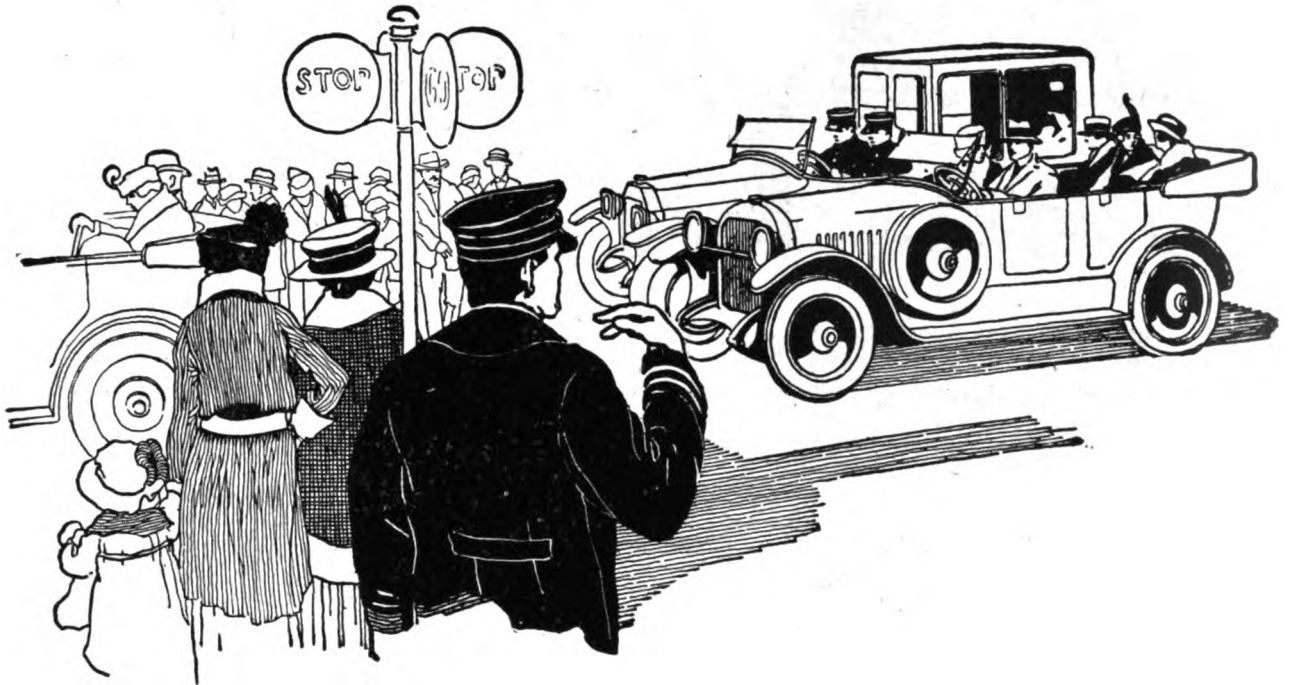
GARAGE SERVICE WRENCHES



WRITE FOR CATALOG NO. 300

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The Ideal Motor



THE Ideal Motor ought to run at full efficiency month in and month out. Yours would—if it were not for the ever incurring plague of carbon. Why go on having it cleaned out every month or so—and worse than that having a sick, half-efficient motor the greater part of the time? The Esta Water Auxiliator will clean a fouled motor and will keep it clean. It gives you a motor full of life and energy—a motor that jumps when you touch the accelerator; that climbs with eagerness; that throttles down to a walk in high gear.

The Esta Water Auxiliator kills carbon at its source, at the point of formation. It is a handsome, polished, cast aluminum tank, easily installed under the hood on the back of the dash of any car, truck, tractor, yacht or stationary engine. It is a carbon preventor—not a temporary remedy. It becomes a real, integral part of the motor for all time.



The Esta Water Auxiliator is the only device of its kind in the world. It is fully protected and patented under date of January 11, 1916, and under date of September 25, 1917. Additional patents are now pending.

PRICE \$15.00

\$16.50 West of the Eastern boundary of Colorado. Somewhat higher in Canada.

ESTA WATER AUXILIATOR

Don't take our word for it—here is the proof:

The Automobile Club of America:

"With an Esta attached to a carbonized motor at the end of the decarbonizing run there was obtained in one hour's time an increase in speed of 35.7 per cent. and of power 35.6 per cent.; also a decrease in fuel consumption of 17.2 per cent."

Pratt Institute of Brooklyn:

"At the end of test there was shown an average de-

crease in fuel consumption of 25.5 per cent. and an average increase of 27.5 per cent. in speed.

"The result of these tests would indicate the following points in favor of the Esta Water Auxiliator:

- | | |
|--------------------------------|------------------------------------|
| 1. Decreased fuel consumption. | 4. Smoother operation. |
| 2. Increased speed. | 5. More nearly perfect combustion. |
| 3. Increased power. | 6. No carbon deposited. |

You can get an Esta anywhere—if your nearest dealer or garage does not have it phone, write or call on us.

The ESTA Co.

103-107 Massachusetts Ave., Boston
Telephone, 3177 Back Bay

N. B.—To Dealers! If you are progressive you will carry ESTAS. Write for particulars.

Watch the Saturday Evening Post for Our Full-Page Announcements May 18, June 1, June 15, June 29.

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RAYFIELD

CARBURETORS

Clear for Action!

We are in this war to win. You can again help. When needed, the resources of our company will be placed unreservedly at the service of the Government.

Up to the present time, war demands have interfered but little with the production of RAYFIELD Carburetors.

However, any day may bring about big changes.

We are ready to do our part—to make a thorough job of it,

we need your co-operation. By placing your order for the RAYFIELD today you will help us to *clear the decks* for Government requirements. Also you bring your car up to war standards, for the RAYFIELD equipment means economy and efficiency.

By practicing economy, you conserve for the Government.

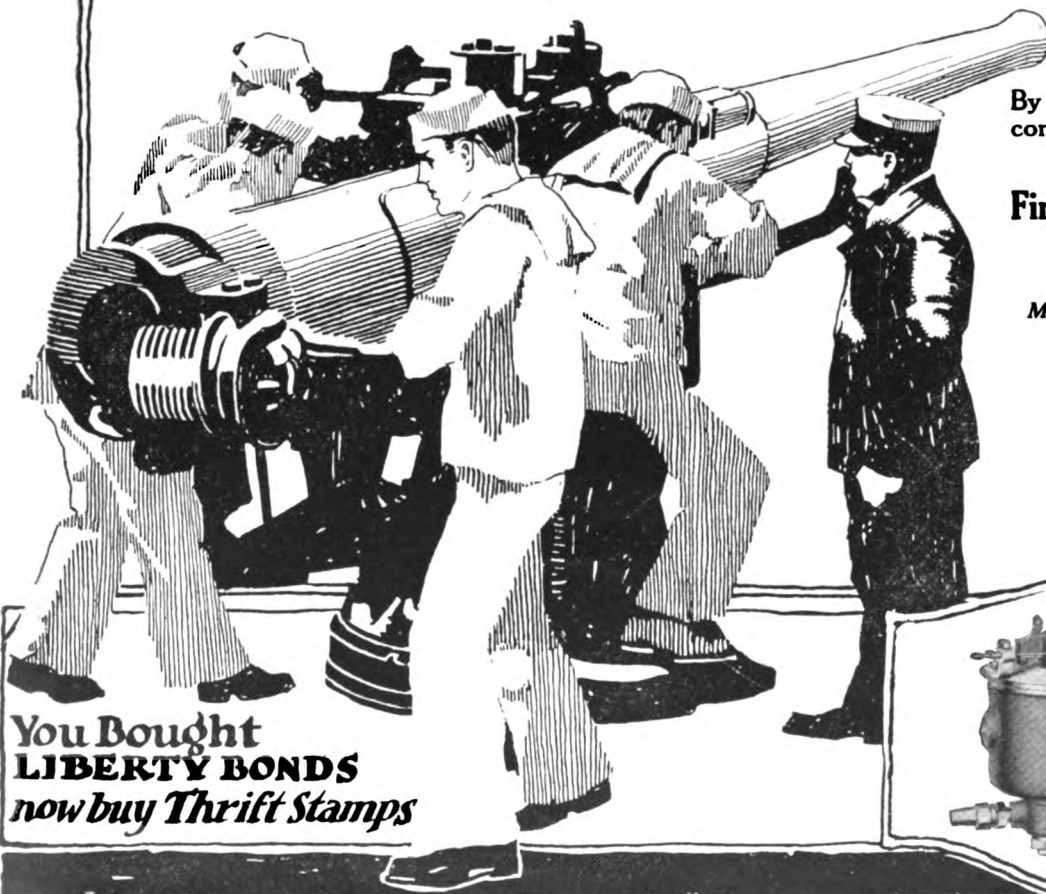
Findeisen & Kropf Mfg. Co.

21st and Rockwell Streets
CHICAGO

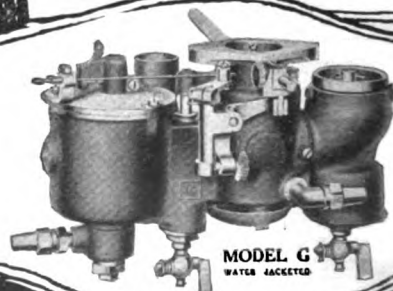
Manufacturers of the RAYFIELD
Carburetors—

"The World's Best"

**Service Stations
Everywhere**



**You Bought
LIBERTY BONDS
now buy Thrift Stamps**



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The AUTOMOBILE JOURNAL

VOL. LXV.

PAWTUCKET, R. I., MAY 25, 1918.

NO. 8.

"Do Your Bit and Know Your Own Car" Is Motorists' Slogan

**Country's Insistent Need of Motor Mechanics Is An Imperative Demand
Upon the Motorists to Do Their Own Adjusting, Repairing and
Maintenance Work—National Automobile Dealers
Urge Education of Car Owners**

"DO YOUR bit and know your own car" is the most appropriate, as well as the patriotic slogan that should be adopted by motorists while the war continues, as the time has come when every car owner should bear in mind that his country needs the services of thousands of mechanics who are capable of doing repair work on motor cars. In order for motorists to contribute to the sinews of war it is imperative that they should learn as much as possible about the mechanical operation of their cars, so that they can keep them running without calling upon mechanics whose services are needed by the government.

Necessary War Machines.

A movement to encourage motorists to learn more about their cars, with the object of aiding the government, was started and is being promoted by the National Automobile Dealers' Association. This campaign has received widespread endorsement from motor car manufacturers, dealers and government officials. The need of mechanics is well emphasized by Major Mark L. Ireland, Quartermasters Corps of the United States Army, who is in command of the extensive motor car repair shops at Fort Sam Houston, Tex. He says that the great need in the war is motor transportation and that the greatest problem arising in connection with motor transportation is to keep it available for service at all times. He states that in order to accomplish this the government is in actual need at this time of hundreds of motor car mechanics and men possessing qualifications making them desirable in the motor sections of the United States army.

Instructions for Overhauling Cars.

This issue of the Automobile Journal is largely devoted to the subject of caring for the motor car, treating comprehensively on the maintenance, overhaul

HELP WIN THE WAR

You are asked to help your government in this movement, in which the following national organizations are cooperating with the U. S. Bureau of Mines and the Council of National Defense: National Automobile Chamber of Commerce, Motor and Accessory Manufacturers, Society of Automotive Engineers and Automobile Association.

TO PREVENT UNNECESSARY LOSSES.

Store gasoline underground. Use wheeled tanks with measuring pump and hose. They prevent fire, evaporation and spilling.

Don't spill gasoline or expose to air—it evaporates rapidly and is dangerous.

Don't use gasoline for washing—use kerosene or other material to cut grease.

Stop gasoline leakages. Shut off gas at feed pipe where car stands long.

Adjust brake bands so they do not drag. See that bearings run freely.

Don't run engine when car is standing. Starter battery is benefited by frequent use.

Have carburetors adjusted at service stations—they will make ordinary adjustments without charge.

Keep needle valve clean and adjust carburetor (while engine is hot) to use leanest mixture possible—rich mixture fouls engine and is wasteful.

Pre-heat air entering carburetor. Keep radiator covered in cold weather. Better vaporization results.

Have spark timed correctly. Drive with spark well advanced—late spark increases consumption.

Keep spark plugs clean and spark points well adjusted to insure hot spark.

Avoid high speed. The average car is most economical at 15 to 25 miles an hour.

Know your mileage per gallon. Fill tank full and divide odometer mileage by gallons consumed.

and repair of 15 motor cars as examples. These articles, together with the leading story, General Power Plant Overhaul, were prepared to assist in the campaign for the education of motorists; and, while they treat specifically with the methods of overhauling and repairing the designated cars, the instructions will afford a liberal education for the owners of other cars, as much of the information is applicable to practically all makes of cars.

The Used Car Must Be Maintained.

Aside from the patriotic and economic objects of the "Know Your Own Car" campaign, the mechanical knowledge that is given in these instructive articles should be of value to anyone in purchasing a used car. It is now a known fact that the production of new cars will be inadequate to meet the demand during this year, and this condition has already resulted in an advance of from 25 to 40 per cent. in the prices of used cars. The man with a fairly good understanding of the mechanical operation of a motor car and what it will require to increase its efficiency, knows what he is purchasing, and on that account will be able to secure a better bargain; therefore, the methods of detecting weaknesses in cars, which are given in the overhaul articles on the following pages, will afford him practical knowledge of considerable value.

Making Repairs as Needed.

To conserve the usefulness of the motor car and to prolong its efficiency before it must undergo a general overhauling every owner of a car should concern himself about the methods that can be used to keep all the vital working parts in good running order. He should continually know whether there is any weakness in parts, due to lack of proper adjustment or repair, which, if not checked at once, may soon contribute

their weakness to others and multiply trouble. Do not allow the car to gradually deteriorate when a general overhaul becomes absolutely necessary. By taking precaution and following the instructions given in these overhaul stories the motorist can, as it is found necessary, overhaul and repair certain parts and units, and thereby avoid a general overhauling as one big job.

Greater and more uninterrupted service can be had with the car while on the road if it is put into the proper working condition for the trip before it is driven from the garage. There are thousands of careful motorists who prolong the working efficiency of their cars by continually giving them the attention that any piece of machinery requires. To forestall the premature general overhauling of the car the cautious motorist frequently goes over his machine in about the same manner that the careful locomotive engineer goes over his locomotive before taking it from the round house on a trip. The motorist should examine all nuts and if loose tighten

them; look for loose and disconnected wire terminals; be sure that there is sufficient oil in the crank case oil reservoir and that the chassis is thoroughly oiled wherever necessary; tighten all loose spring hangers and clips; be sure that the tires are inflated to the limit of pressure set by the tire manufacturers.

The disinclination on the part of many car owners to learn about the me-

chanical operation of their cars is responsible for much of the work requiring services of mechanics, as it is through the neglect of minor adjustments and repairs that more serious defects develop.

Men who have never taken the trouble to read instruction books or the trade magazines to gain the necessary information to enable them to keep their cars in order usually permit many parts to get out of adjustment and repair before calling upon the service of a mechanic, with the result that extensive repairs are usually necessary. In England, where thousands of owners that formerly never did anything about their cars but ride in them and give the chauffeur orders, are now doing their own driving, as well as repair work from patriotic motives, and their experience as recorded in the English motor magazines would indicate that they not only derive greater service from their machines at less expense, but obtain greater satisfaction from motoring through the interest they have developed in the machines.

Notice to Subscribers

The Accessories Directory that was to have been a feature of this number will appear in the June 25th issue of the Automobile Journal and will include illustrations and descriptions of hundreds of the most useful and desirable parts and accessories for the automobile. Owing to the delay in transportation and the unusual manufacturing conditions, many manufacturers were late in making their returns and as it was desired to make the directory as complete as possible, its publication was delayed for the benefit of the subscribers.

Recommendations of War Service Committee For Conserving Labor and Releasing Mechanics

Great Amount of the Work on a Motor Car is of Minor Character
Such as Adjustments Which the Owner Can Make and
Bring About Great Saving of Man Power

The War Service Committee of the automobile dealers of the United States after carefully reviewing the situation created by the war and the needs of the government, made a report of its findings, which was recommended to the War Economy Board of the Council of National Defense. The report follows:

Unnecessary Service.

Careful investigation has disclosed the fact that unnecessary service, requiring the use of mechanics whose services might be dispensed with and released for the use of the government or for work in other channels, due to the practise of issuing free service coupon books, service cards and other unnecessary work done because of custom—for a great majority of the work is of minor character, such as adjustments, etc., which the owner should make himself—can be eliminated and a very material saving of man power be made.

Sunday Work.

The large proportion of the mechanical work done on Sundays is occasioned by the use of cars almost entirely for pleasure purposes and is usually emergency service on the road. It is suggested that a proper curtailment of this Sunday service will bring about a material saving of labor and release mechanics.

A substantial saving of mechanics' time can be made by the elimination of

all-night service except where absolutely necessary for cars used in actual essential pursuits, including work on commercial vehicles in use for commercial purposes and on trucks which may require attention. It is suggested that it is entirely practicable that the work be handled at some one designated shop or in larger places divided up among a few, thus releasing a large amount of labor now necessary to keep open a number of establishments.

Education of Mechanics.

It is entirely practical for dealers associations in larger cities to establish classes for the purpose of educating mechanics, drivers, etc., and for shops generally to encourage apprentices. In smaller cities, where no association exists, classes may be formed by the co-operation of dealers and could be held in garages in the evening and at odd times.

Establishing Cash Basis.

It has been demonstrated that the cash basis for labor, parts and supplies is of great economical value, as it eliminates a lot of unnecessary work, reduces clerical help and office maintenance and reduces losses. Also, much unnecessary work is saved when cash payment is required because it has been demonstrated in towns working on cash basis, users do a large amount of the ordinary small adjustment work themselves and only call upon the mechanic

when actual necessity requires it.

Education of Users.

It is clearly evident that users are not properly informed regarding the handling of cars, thus making demands for service and unnecessary work extremely great. If a user is properly instructed in the handling of his car and urged to keep his car properly equipped, to see his tools are in order and all there, that his jack is in working condition, that his extra inner tube and other extra equipment is in proper repair, a large amount of unnecessary mechanics' time will be saved, as it has been demonstrated by investigation that a large proportion of the emergency work is occasioned because the users' equipment is not in proper condition so that he can take care of his emergency or road repairs himself.

Elimination of Waste.

Inquiry develops the fact that a great deal of material, such as gasoline, oil, grease, etc., can be saved by proper shop methods and immediate steps have been taken to canvass this important matter in a systematic manner.

Demonstrating Expense.

While not a general practise, yet in some localities a large reduction in the number of demonstrating cars and cars used by salesmen will show a material saving in expense for the dealer, as well as time required in keeping these demonstrating cars in order.

General Power Plant Overhaul

Practical Methods for Overhauling and Repairing All the Important Parts of the Power Plant and for the Refitting of New Parts

TYPES OF PARTS AND UNITS OF 15 CARS, AS PARTICULARLY RELATED TO GENERAL POWER PLANT OVERHAUL.

Make	No. Cyl.	Cylinders		Valves Located	Type	Transmission	Location	Cooling	Oiling	Electric Ignition	
		Make	Engine Cast							System	System
Ford.....	4	Own	Block	Side	O. Disc	Planetary	U. P. P.	T. S.	F. & S.	None	Own
Chevrolet 490.....	4	Own	Block	Head	Cone	Sliding Gear	U. P. P.	T. S.	Splash	Auto.	Conn.
Overland 79.....	4	Own	Sep.	Side	Cone	Sliding Gear	Rear Axle	T. S.	F. & S.	Auto.	Conn.
Maxwell.....	4	Own	Block	Side	Cone	Sliding Gear	U. P. P.	T. S.	Splash	Simms	A. K.
Studebaker.....	4 and 6	Own	Block	Side	Cone	Sliding Gear	U. P. P.	Pump	Splash	Wagner	Remy
Dodge.....	4	Own	Block	Side	D. Disc	Sliding Gear	U. P. P.	Pump	F. & S.	N. E.	Delco
Cadillac Eight.....	8	Own	Block.	Side in V	D. Disc	Sliding Gear	U. P. P.	Pump	Force	Delco	Delco
Reo.....	4 and 6	Own	Block	Side and head	D. Disc	Sliding Gear	Center	Pump	Splash	Remy	Remy
Oldsmobile Eight.....	8	Own	Block	Side in V	Cone	Sliding Gear	U. P. P.	Pump	Force	Delco	Delco
Chalmers 6-30.....	6	Own	Block	Side	D. Disc	Sliding Gear	U. P. P.	T. S.	F. & S.	West.	Remy
Saxon Six.....	6	Cont.	Block	Side	D. Disc	Sliding Gear	Rear Axle	T. S.	F. & S.	Wagner	Remy
Buick "Little Six"....	6	Own	Block	Head	D. Disc	Sliding Gear	U. P. P.	Pump	Splash	Delco	Delco
Paige.....	6	Cont.	Block	Side	D. Plate	Sliding Gear	U. P. P.	Pump	F. & S.	G. & D.	Remy
Hudson Super Six....	6	Own	Block	Side	O. Disc	Sliding Gear	U. P. P.	Pump	F. & S.	Delco	Delco
Hupmobile.....	4	Own	Block	Side	O. Disc	Sliding Gear	U. P. P.	T. S.	F. & S.	West.	A. K.

Abbreviations—Sep., separate; O., Oil Disc; D., Dry Disc; U. P. P., Unit Power Plant; T. S., Thermo-Syphon; F. & S., Force and Splash; Auto., Auto Lite; N. E., North East; West., Westinghouse; G. & D., Gray & Davis; A. K., Atwater Kent.

THE general practise of adjusting, repairing and refitting new parts of the power plants of 15 cars designated in the accompanying table are treated on the basis of the general principles of the various types of parts and units. This main article is the key to the overhaul of the power plant of each car, differences of disassembling and reassembling of the parts and units being given in the overhaul article of each car.

In the table are designated only the parts and units, the adjustments and overhaul of which are described along general lines in this article. In grinding and reseating valves general practise are herein outlined, including the difference between removing and replacing valves in the side and valves in the head of motors. Scraping and refitting crankshaft and connecting rod bearings are treated herein along the lines of general practise. Prevailing types of clutches, cone and disc, used on the 15 cars designated in the table, are each handled separately, as a type, in this article. All these cars, except the Ford, have sliding gear transmissions and their overhaul and adjustments are herein given along the lines of general principles. The overhaul of the planetary transmission is given in the overhaul story on the Ford. The several different types of oiling systems of these cars, shown in the table, are described and overhauling practises given. The ignition systems used on the 15 cars are also designated in the table and the adjusting of these systems given in this general story.

Drain all the water from the radiator and refill with a strong solution of either potash or washing soda, which should be strained through a cheese cloth before being put into the radiator. Run the engine for about five minutes, or until the solution is fully warmed, then let the car stand for half an hour. Run the engine again until the system has thoroughly heated, then drain off the solution. This solution should be kept until after the engine has been reassembled and the process repeated, care being taken after draining off the solution to refill with clean water several times until the entire cooling system is free of the solution.

After the water has been drained from the cooling system, loosen the hose connections at the bottom and top of the radiator and remove the rod that holds the radiator rigid to the dash.

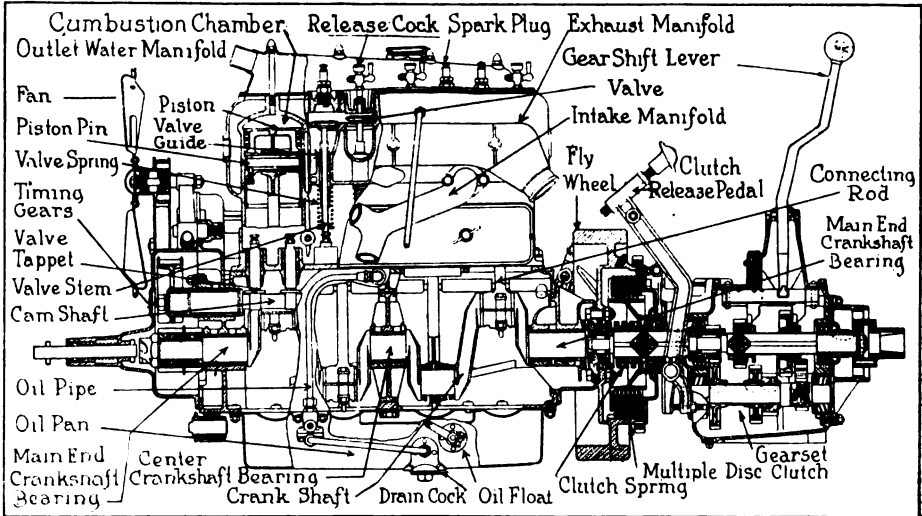
Then take off the radiator and lay it flat upon the work bench. A careful examination should be made for leaks, which should be soldered.

"Stripping Down" the Engine.

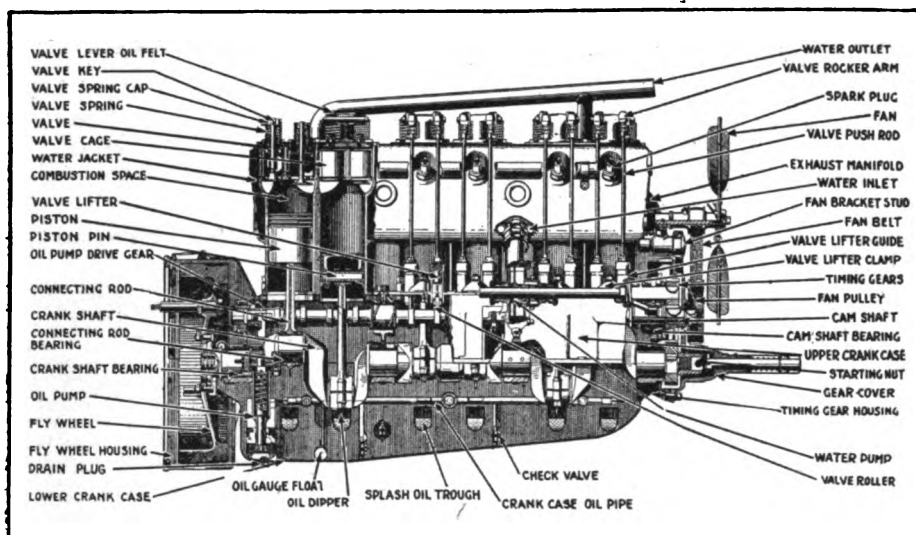
Remove the water manifold and disconnect all wires and cable and tie them on the dash, out of the way. All wires and cable connections should be properly tagged to assure accurate replacement. Then remove the intake and exhaust manifolds, leaving carburetor attached to the intake manifold, unless it is thought necessary to take it apart for a thorough cleaning, repairs or replacements. Also, remove the fan from its supporting bracket. Removing all these auxiliaries from the engine allows one a greater freedom in working around it in grinding and reseating valves, and in doing other necessary work.

If the car has a vacuum fuel pressure tank, remove it by uncoupling the vent tube to the intake manifold, as well as the gasoline line leading to the gasoline tank, laying it aside, with care being taken not to bend or otherwise damage the copper tubing by accidental contact.

The impurities in the gasoline, with those drawn into the carburetor with the air in the form of dust, metallic particles and the residium of lubricating oil, which may also contain dirt and organisms, are not entirely expelled from the engine cylinders through the exhaust valves and accumulate on the piston heads, the combustion chambers, the valve heads and all parts exposed to the heat of the explosions.



Typical Four-Cylinder Unit Power Plant with Valves in the Side.



The Buick Unit Power Plant as an Example of the Typical Valve in the Head Motor.

This first has the appearance of oily soot, but it is gradually baked until it resembles coke. These accumulations are known as "carbon" and when hardened frequently become heated incandescent and cause gas being compressed during compression strokes to ignite prematurely, which is referred to as "back firing," for it retards the movement of the engine and results in loss of power, as well as being destructive of the main and connecting rod bearings.

Five Ways to Remove Carbon.

Five methods of removing carbon from the engine are open to the owner.

1. For light deposits removal may be accomplished by the addition of pure kerosene in either of two ways. The most efficient method and advisable because it does not tend to dilute the oil in the crank case is applied as follows: After the engine has been run for four or five minutes and thoroughly warmed, drop about a tablespoonful of kerosene into the auxiliary air intake of the carburetor with a medicine dropper. Immediately afterward, place a like amount of water in the air intake. Alternately apply kerosene and water in the same way until about six tablespoonfuls of each have been used, and run the engine until all traces of smoke have disappeared from the exhaust. If this remedy is applied once a week the carbon is kept within control and does not have a chance to harden on the piston heads.

2. The second method of applying kerosene consists of pouring about half a cupful of kerosene into each of the cylinders before leaving the car for the night, while the engine is still hot. The kerosene has a tendency to dissolve the carbon, which is blown through the exhaust when the engine is started in the morning. The one disadvantage of this method is that the kerosene will filter by the pistons and dilute the oil in the base.

Carbon Removing Preparations.

3. Under the third method of carbon removal may be considered such liquid and powder carbon removers as are now on the market. Some of these are designed for application directly to the engine, others for mixing with the gasoline. The action differs. In some cases it is similar to that of kerosene, in others, the principle is the addition of volatile liquids, which have a tendency to burn off the carbon deposits.

4. The fourth method, which is applicable in all cases, is that of scraping. With removable head engines it is an easy matter to scrape the carbon from the cylinders, valve pockets and piston heads, with either a putty knife or screw driver. With block other type engines, not fitted with removable heads, the spark plug and valve covers may be removed and flexible scrapers inserted in the cylinders.

Where carbon is being scraped from the engine by this method, two points are to be observed; first, that the piston is at the top of its stroke or nearly so, in order that the polished walls of the cylinders are fully protected; and, second, that the valves are both seated, to prevent the carbon scrap-

ings from working into the valve guides and manifolds. Frequent applications of kerosene tend to soften the carbon and make its removal easier. A compressed air blast or tire pump may be used to blow out the carbon when it has been loosened from the cylinders.

5. The fifth and last method is being generally adopted and when properly applied is very efficient. It is called carbon burning, and consists of igniting the carbon in the presence of pure oxygen, when it will burn or crackle away from the metal very rapidly. As this is a repair or garage man's process we will not go into it in detail.

Exhaustive experiments carried on by engineers have proven that the introduction of a water vaporizer to the intake manifold shows a tendency to reduce carbon. There are a number of such devices on the market which are designed to supply the engine

with a predetermined amount of water vapor as a preventive of carbon deposit.

Grinding and Reseating Valves.

First, determine whether valves seat properly: Cover the face of the valve with Prussian blue and then turn it around one-quarter; if the seat shows a clear line of blue, your valve is fitting perfectly. To find whether valve seats perfectly, cover the valve seat with Prussian blue and turn one-quarter. If there are points the blue does not cover, the valve and seat require reseating and grinding. Ordinary grinding of valves with a valve grinding compound will remove small pits, but if valve head is warped or the offset edges appear on the valve seat, it should be reseated by a reseating tool and then ground.

Pitted valves, caused by the gas of combustion passing through them (usually exhaust valves), must be either faced by grinding or recut. The actual cutting operation, as well as the refacing of valves, is really a repair man's job, for it is essential that the valve stem center up with the valve seat and valve face. There are, however, a number of machines on the market designed for special cars with which in some cases valves may be refaced and valve seats restored.

One must remember that there is a limited quantity of metal in the valve seats and that after a certain number of grindings or recuttings the cylinder block will be destroyed, so that it is essential not to remove more metal than necessary, either by grinding or cutting. Recutting is only necessary when the valves or seats are either deeply pitted or worn out of round, though after a certain number of grindings a ridge may be worn in the top of the seat, in which case recutting is the only form of restoration.

How to Remove Valves.

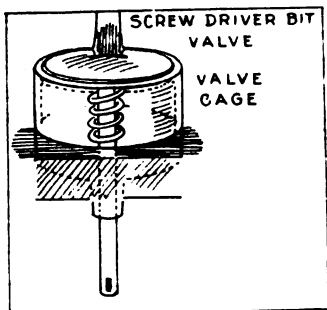
Valves in the sides of motors are removable by compressing the spring with a Y iron and block of wood or a regular valve lifter. Tie the valve spring with a piece of wire before attempting to remove it. Be sure to tag the valves in order to replace them in their regular valve seats, as there is considerable uncertainty of their fitting if interchanged.

To grind the cage type of valve, remove cage and valve and grind in the same manner as the poppet valve.

An example of the cage valve is in the overhead valve motor of the Buick "Little Six," and here is the manufacturer's method of handling it: In the upper end of each cylinder are three small openings, two of which are closed by poppet valves, while a spark plug is inserted in the third. The valves, with their seats and springs, are contained in cages, which are held in place in the head of the cylinder by threaded rings. The valves are ground on their chamfered edges to fit the seats on the lower rims of the cages and when closed they are held against their seats by springs. One valve of each cylinder opens into the intake manifold and the other into the exhaust manifold.

Tools and Material for Grinding.

The grinding operation requires considerable patience and



Type of Valve in Cage.

unless it is carefully done it will be entirely unsatisfactory. For the work either emery or grinding compound may be obtained at practically any automobile supply house. Grinding compound is to be recommended since it comes all ready prepared.

Valves should never be interchanged with others in the same engine, and should always be kept in their own cages. For this

reason each valve should be removed, ground and replaced without disturbing the others in the block, though if they are properly numbered such a precaution will be unnecessary.

A screw driver answers the purpose of a grinding tool in most cases, though there are a few valves, like the Ford, that do not have a slot in the head, but instead are fitted with two holes. For grinding these a Y shaped piece of iron or a piece of wood with two nails driven in its face may be used.

After the valve has been removed the valve chamber, as well as the entrance to the cylinder, should be stuffed full of waste or cotton cloth, so as to prevent the entrance of the valve grinding compound. A piece of string attached to the stuffing enables the operator to remove it more readily.

Details of the Operation.

Smear a small amount of grinding compound or fine emery and oil on the valve seat and drop the valve into position. With the screw driver or special tool held between the palms of the hands or the thumb and first finger, give the tool a quarter turn and back again. Do this several times, and continue the operation until all the face of the valve has been ground upon all the points of the seat.

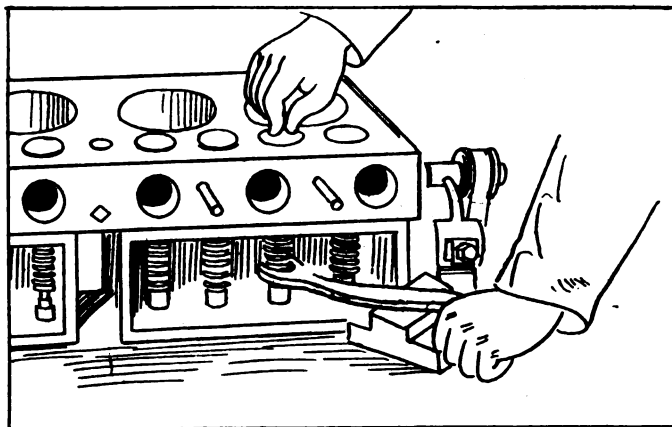
A rotary motion is not practical because of the tendency to grind scores in the valve face and seat. A valve finished in the manner directed will present a smooth and almost polished surface to the valve seat, which is similarly finished. It will have no high places and no matter in what position it may rest it will always be tight. A perfectly ground valve will resist the pitting action longer and maintain its efficiency a greater length of time than one imperfectly ground.

Precautions to Be Taken.

Unless certain precautions are taken the valve will soon pit or score over again. To prevent this action it is essential that the valve springs are strong enough to seat the valve quickly, and that the tappets or rocker arms do not hold the valve open.

Valve or tappet adjustment varies in different engines. Where the tappets and valve stems are short the adjustment can be made closer. Coarser adjustment is necessary in engines with long valve stems or tappets.

Because of the effect of heat on the length of the valve stems and tappets or push rods, the clearance between the



Removing Valve Spring with Y Iron and Piece of Wood for Leverage.

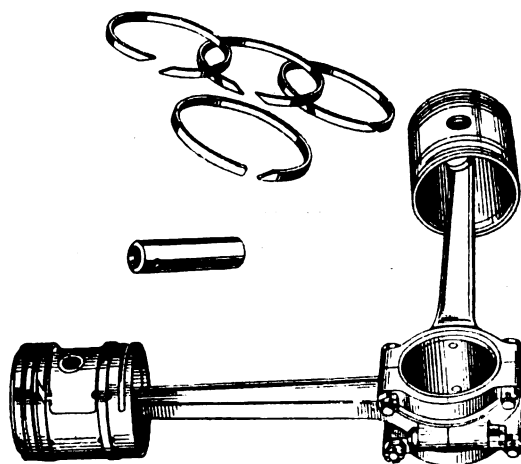
tappets and valve stems should be adjusted after the engine has heated to its running temperature. This clearance should be approximately the thickness of the paper upon which this article is printed and gauges may be obtained from automobile supply houses by which it may be measured.

Attention to the Valve Bushings.

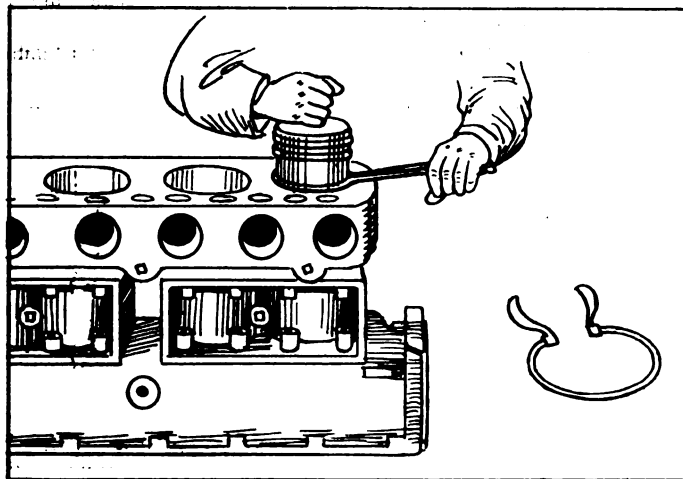
Another important part of the engine which must be in condition to get satisfactory results is the valve stem bushings. We have had many queries from our readers as to loss of power, difficulty in starting, engines that could not be throttled, etc., and in the majority of cases the trouble could be traced to air leakage by the valve stem bushings.

Most engines have been designed so that the valve stem bushings may be removed and replaced with new. If this cannot be done, however, a competent repair man can usually bore out the block and bush the holes for a small charge. The owner can never hope to obtain satisfaction from an engine that is fitted with loose valve stem bushings.

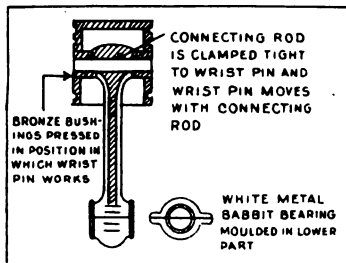
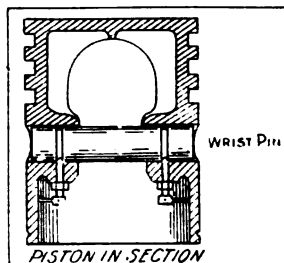
Air leakage at any point of the intake system between the carburetor and engine has an effect that varies with the position of the leak. The deleterious effect of extra air admitted near the carburetor is not as great as that admitted near the



Typical Connecting Rod and Crankshaft Throw Assembly on Eight-Cylinder Motor: The Example is of the Oldsmobile Eight-Cylinder Motor. To the Upper Ends of the Connecting Rods Are Attached the "Lynite" or Aluminum Alloy Pistons, a Steel Hardened and Ground Wristpin of Ample Proportions Being Used to Connect These Members. The Wristpin Rocks in the Connecting Rod and Not in the Piston, and an Ample Bronze Bushing Is Used at This Point. Three Compression Rings Are Fitted to the Upper Part of the Piston, and at the Lower End Is a Scraper Ring, Which, Assisted by a Series of Holes in the Piston, Prevents an Excess of Oil Passing Up the Cylinder Into the Compression Chamber.



Piston Ring Should Be Compressed When Replaced by Means of a Ring Compressor Tool.



Two Types of Wristpin Bearings. The One on the Left Is Stationary. The Wristpin in the Other Moves with the Connecting Rod.

engine. For this reason every care should be taken to prevent leaks at the manifold joints. Copper asbestos, thin steam packing or paper gaskets coated with shellac may be used, depending upon the joint.

Overhaul for Scored or Worn Cylinders.

Scored cylinders or cylinders worn out of round may be evidenced by lack of compression. A comparison of the power required to turn the crankshaft over by the hand crank, with all but one of the spark plugs removed, is the simplest test for locating the faulty cylinder. Unless the scores are deep the following method will give satisfactory results, and though it may have to be used frequently, it costs but little in comparison with a new cylinder or the grinding of the cylinder and fitting of new pistons and rings.

With the engine running at about normal speed, slowly pour two or three spoonfuls of Dixon's flake graphite into the carburetor auxiliary air intake. Between each application a short time should be given the engine to regain its normal speed. The spark plugs should then be removed and cleaned and the engine will be found to have regained much of its compression, if the scores were small, for the graphite will fill them and present a smooth surface, which will prevent the leakage past the pistons. If the scores are deep the graphite remedy is not always effectual, and either reboring or filling of the scores will be necessary. Both of these methods are repair jobs and can only be done by persons experienced in the work. Complete dismantling of the engine is necessary.

Restoration of Pistons and Cylinders.

No owner, or even a repair man, should undertake cylinder restoration unless the tools and equipment for such work are available. Reliable instruments must be used to determine dimensions. The wear from piston "side slap" will be found in the walls paralleling the crankshaft axis. Scoring, from broken rings may be anywhere, but the scores from wristpins will be on what may be referred to as the "for-

ward and rear" walls. These can only be restored by reboring, which might necessitate new rings and pistons, or simply new piston rings.

New piston rings can be obtained to any required dimensions and in different types.

Those that are designed to be "leak proof" are better than those merely diagonally split. The old piston

rings may be defective in that they have lost elasticity. Leaks will be indicated by blackened or discolored places on the circumferences. The "splits" in some rings may be in line from top to bottom (register) and gas may escape into the crank chamber during explosion strokes. Accumulations in the piston grooves may prevent free action.

The piston rings must fit perfectly. There is little probability of the pistons wearing. Attention should be directed to the condition of the rings and cylinders. The piston rings can be sprung sufficiently to remove them from the pistons. After removal they should be kept with the pistons they were originally on, if they are to be again used. The rings can be replaced by springing them over the "lands" of the pistons or by using thin strips of steel or other metal to bridge the top and middle grooves while slipping them on. In service stations special tools that expand the rings so they may be placed instantly wherever desired are generally used.

Without the rings a piston will fit loosely in a cylinder, for from $\frac{4}{1000}$ inch (at the skirt) to $\frac{8}{1000}$ inch (at the top) is allowed for expansion, and in high speed engines, where the temperature is very high, as much as $\frac{15}{1000}$ inch is not regarded as excessive.

Crankshaft Main Bearings and Connecting Rod Bearings.

When one of the main crankshaft bearings becomes worn, the lower cap is removed and a shim is taken out so it can be drawn tighter to the shaft. If it is burned or cut then a new lining of brass or babbitt, called a "bushing," must be put in the cap or it can be dressed by scraping.

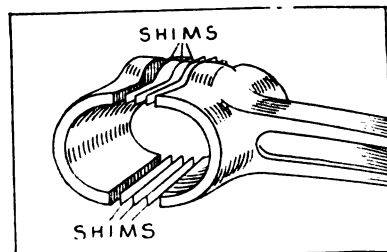
Thin plates of metal placed in both main and connecting rod bearings are known as shims. They are fitted in between the lower cap and upper end of bearing, in order that they can be drawn closer together when loose by removing a shim. The bushing is a plain bearing usually made of babbitt, phosphor bronze or white metal. Phosphor bronze bushings are very hard and have a long wearing efficiency, but are liable to "seize" if run without oil. The white metal bushing is a layer of that metal, run, when in a molten state, into a channel of the bearing. It becomes hard and is then scraped and polished. It has the quality of not being liable to "seize" and causing damage, but if run for a long time a knock may be the result.

The upper end of the connecting rod contains a solid bushing that forms the wrist or piston pin bearing. On account of the small space in the piston it is not possible to have this bushing split and held in place by a cap. The bushing is set in the connecting rod and the wristpin pushed through it. The wearing of this bearing is slight. A new bushing can be driven into the connecting rod.

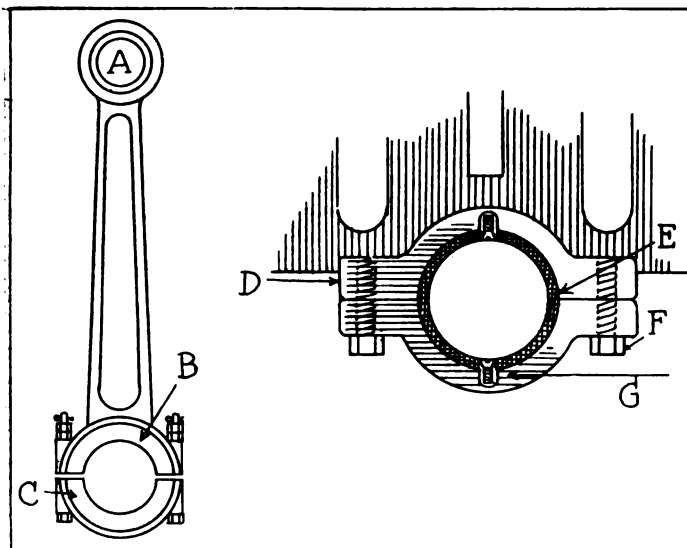
Scraping Babbitt Bearings.

When new babbitt bearings are put into place, either in the connecting rods, or the main bearings, it is customary to scrape them in so as to have the frictional surfaces as even as possible. To scrape a bearing properly takes a great deal of time, as well as patience, yet satisfactory results cannot be expected of a new bearing unless it is properly fitted, either by reaming or scraping.

To scrape in a connecting rod bearing the connecting rod is first removed from the crankshaft and a thin coating of Prussian blue smeared on to the crankshaft journal. The connecting rod and its cap are then put into place and the shaft or rod revolved one full turn. The connecting rod is then removed and the blue marking on the babbitt noted.



Connecting Rod Bearing End with Cap Removed to Show Use of Shims for Taking Up Connecting Rod.



Connecting Rod and Crankshaft Bearings: A, Wristpin Bearing; B, Crank Pin Bearing; C, Cap; D, Upper Half of Bearing; E, Babbitt Metal Lining or Soft Brass; F, Cap Screw; G, Lower Bearing Cap.

High spots or pointed projections of the babbitt will be polished points, surrounded by blue rings. These high spots must first be scraped off with a sharp scraper made for the purpose, which may be obtained at any automobile supply house.

The color should next be wiped from the babbitt, the shaft coated again with blue as before, the connecting rod clamped into place, given one turn and removed. The distribution of color on the babbitt will be more even, and will indicate the higher portions, which should be scraped off. The operation is repeated again and again until the transfer of the blue from the crank pin to the babbitt covers a great portion of the surface.

The bearings should not be adjusted so tightly that the compression of a cylinder in good condition will not cause the piston to spring back when the piston is brought up against compression with the starting crank. Then when first bearing is properly adjusted loosen again and adjust the second and the others in the same manner, all bearings being loose except the one being adjusted. After adjusting all bearings singly, tighten them up.

Examples of Types of Oiling Systems.

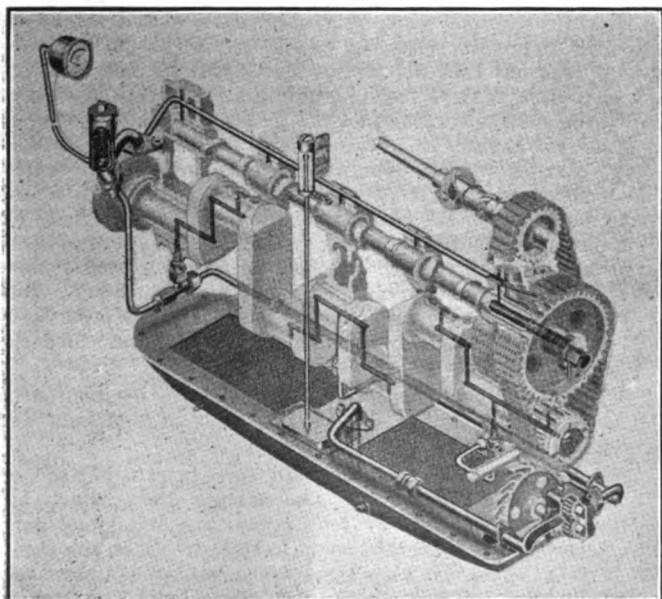
Reo "Four" and "Six:" Splash, aided by pump forcing oil through a system of pipes inside the crank case to the three crankshaft bearings and onto the face of the cam gears. The oil then gravitates to the partitioned reservoirs in the crank case base, where a constant level of oil is maintained and from which the oil is picked up by scoops on the bottom of connecting rods and sent in a fine spray to the pistons, cylinders and connecting rods.

Practically the same system is used on the following cars: Studebaker "Four" and "Six," Chevrolet 490, Overland 79, Maxwell, Dodge, Chalmers 6-30, Saxon Six, Buick "Little Six," Paige, Hudson, Hupmobile.

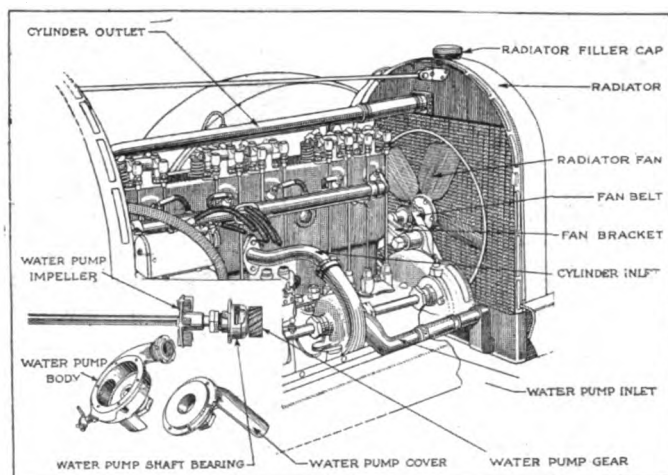
Force Lubrication on Cadillac and Oldsmobile.

The following system of lubrication is used on the Cadillac and Oldsmobile eight-cylinder motors:

The pressure feed, or force, system is strictly by forced feed direct to all the working parts. The oil is supplied to the three main bearings of the four-throw crankshaft through pipes leading from a manifold running along the oil reservoir, and is also directed to the camshaft bearings through a smaller manifold. The connecting rod bearings are oiled through passages drilled in the crankshaft. The oil is circulated by a gear pump driven from the crankshaft spiral gearing, the intermediate gear serving to drive the two water pumps, one at each side of the motor, by means of a cross shaft. An adjusted by-pass valve is provided so that the oil pressure may be maintained to any desired point. To clean this system all the feed tubes leading from the pump to the camshaft bearings should be flushed with kerosene or gaso-



Phantom View of Cadillac Force Feed Oiling System.



Typical Centrifugal Pump and Cooling System as Used on the Buick.

line. A good device for cleaning the oil tubes can be made from a tire pump and rubber tube; air pressure forced through the passages that cannot be reached by a stiff wire will force out of the tubes all dirt. The ducts in the crankshaft should be cleaned in the same manner.

On the other cars on which the splash and forced feed systems are used the pipes should be thoroughly cleaned by the same method. The lower half of the crank case containing the oil sump or reservoir, when removed from the upper half of the crank case, should be given a thorough cleaning and washing with kerosene, to free it of all sediment that may have accumulated from dirty oil and other dirt.

The oiling system on the Ford motor is a semi-splash and circulating system. Directly under the connecting rods and crankshaft throws are three troughs in the lower half of the crank case and the oil reservoir. The lubricant is splashed by the crankshaft throws in a spray over the pistons and cylinder walls. The oil is circulated back and forth by the centrifugal force of the flywheel, throwing the oil to the top of the transmission case, where part of the oil is caught by a tube and fed by gravity to the main bearings and timing gears. The overflow returning to the oil sump keeps the retaining troughs filled with oil. This system is quite simple and principally requires a thorough cleaning if clogged.

Cooling Systems on Fifteen Cars.

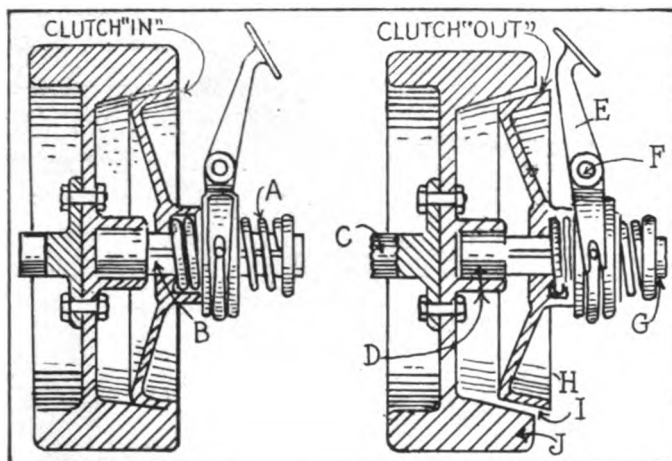
On seven of the cars the thermo-syphon system of water circulation is used and on the other eight cars the water circulation is by pump.

The thermo-syphon system circulates the water through the connecting pipe or hose that runs from the bottom of the radiator to the cylinder water jackets. As the water becomes heated in the jackets it rises to the top of the jackets and passes through the outlet pipe into the top of the radiator, then becoming cool through the radiation of the radiator descends to the bottom of the radiator and circulates again through the water jackets of the engine. It is more necessary to keep this system free of dirt and other accumulations than the system operated by a pump, for the force of the pump will force the water by obstructions.

With the circulating water cooling system a pump is used to force the water through the water jackets and radiator. Nearly all water pumps are driven by a gear on the crankshaft or camshaft, as the motion is positive, without slipping. Following are the prevailing types of water circulating pumps used:

The gear pump is made up of two small gears with large teeth, the two being in mesh, and contained in a snugly fitted casing. The water enters at one side, where the teeth come together, and is carried around to the opposite side in the spaces between the teeth, where it escapes through an outlet.

The centrifugal type of pump consists of a runner or impeller keyed to the shaft, and a close fitting, air tight casing, with outlet passages cored in it. As the impeller revolves



Main Parts of Type of Cone Clutch: A, Spring; B, Clutch Square Shaft; C, Engine Shaft; D, Bearing for Change Speed Gear Shaft or Clutch Shaft—Clutch Shaft Turns Free at This Point in Flywheel Hub, Where Ball Bearing is Usually Provided; E, Clutch Pedal; F, Pedal Pivot; G, Change Speed Gear or Clutch Shaft; H, Friction Cone; I, Leather Facing on Cone; J, Flywheel.

it sucks water from the radiator to its center and then by centrifugal force throws it off at the outer edges of the vanes and out of the casing to the cylinder jackets.

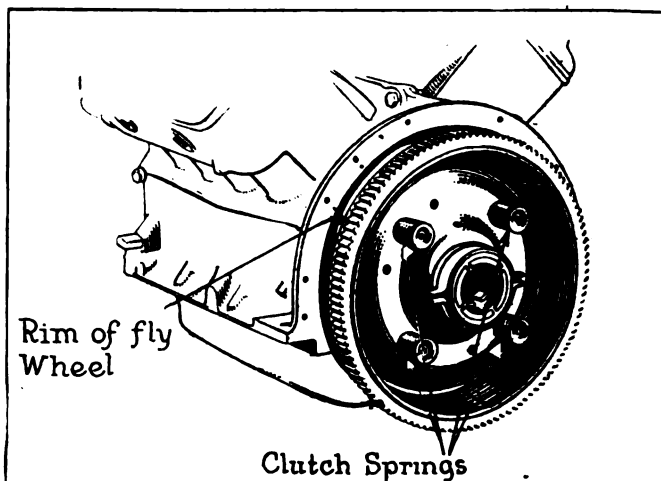
The average water circulating pump requires but little attention, other than to see that it does not become choked by using dirty water. A packing nut on the shaft, in case the pump should leak around the shaft entrance, should be re-packed. This is easily done by turning off the packing nut, removing the old packing and rewinding the shaft with a few inches of well graphited packing and tightening the packing nut. The packing should be wound in the same direction as you turn the nut to tighten it.

The Cone Clutch.

This type of clutch is built into the flywheel and the flywheel forms one of its parts. The rim of the flywheel is broad and its inside is conical shaped, forming the surface against which the cone presses to couple the power. The sliding part of the clutch is termed the "cone," because its rim is cone shape. The surface of the cone that bears against the inner rim of the flywheel is usually covered with leather to afford a good gripping surface. Some cones are lined with fabric or heavy leather. The hub of the cone is bored so that while it may slide on a square or splined part of the clutch shaft which connects to the change speed gear sleeve, still the cone and shaft must revolve together. The forward end of the clutch shaft rests in a bearing formed in the hub of the wheel, which is usually a ball bearing, so that it is supported and yet may revolve independently of the flywheel. A heavy spring presses the cone against the seat formed in the rim of the flywheel. When the foot pedal is pressed forward the cone slides on the shaft, away from the flywheel and separates from it, the spring being compressed.

In disconnecting the cone clutch, remove the shell covering the joint at the forward end of the transmission, also shell covering the clutch hub. Then the short shaft between the clutch and transmission and clutch hub can be removed. Now remove the clutch springs and the clutch can be released from the car. After removing the cone the clutch spider can be taken out by unscrewing the large nut on the end of the crankshaft extension. The coupling at the front end of the transmission is provided with flat hardened bearing surfaces and can be easily renewed when worn, instead of renewing the complete coupling.

The clutch facing should be examined and replaced with new material, or, if not badly worn, washed with kerosene and given a bath of neatsfoot oil. In replacing clutch facings it is important that the copper rivet heads be driven well below the facing surface or the clutch will be uneven. The only adjustment of the clutch is with the coil springs (see illustration), which tend to keep the clutch engaged. It is possible to increase the tension of these springs to avoid



Typical Cone Clutch as Used on Oldsmobile. The Only Adjustment is at Each of the Four Coil Springs.

slipping, the tension should be as little as possible; if they are drawn too tight it will make it harder to engage it or will cause it to grab or take hold too quickly. To determine whether the clutch needs overhauling, test it for easy engaging or disengaging. If it takes hold with a jerk or is hard to disengage its facing needs either renewal or repair or the clutch springs should be readjusted.

The Disc Clutch.

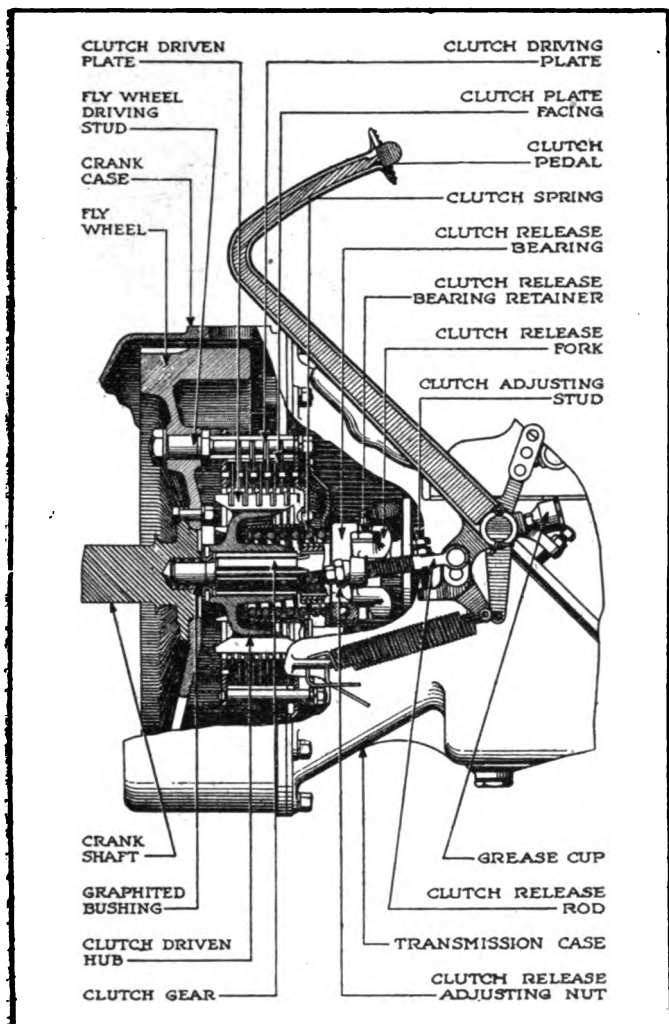
The disc clutch is made up of a series of discs, customarily with more than three discs, which are pressed together when the clutch is engaged, the friction between the discs causing one to drive the other. It is built integral with the flywheel and transmission housing (see illustration Buick type). There are two types of disc clutches, one that runs in a bath of oil and the other being dry. The discs of the oil type are usually alternate steel and bronze or all-steel discs, and the dry type usually consists of steel discs, the surface of one set being faced with a woven asbestos fabric.

As an example of the dry disc clutch, see illustration of Buick disc clutch. This clutch consists of a series of steel plates faced with asbestos friction material, which are connected alternately to the flywheel or to the clutch shaft of the transmission. When the clutch is engaged, a spring forces the plates together so that they revolve as a unit with the flywheel of the motor, but when the clutch pedal is pressed down the plates separate, those connected to the flywheel continuing to revolve while those connected with the transmission are stopped.

In the course of time the friction facing on the clutch discs will wear and when this occurs the clutch should be adjusted to prevent slipping. Adjustment can be made by moving lock nut (see illustration Buick clutch) and adjusting nut on clutch release rod to allow more clearance between the clutch release bearing and the plates. When properly adjusted there should be 1/32 inch clearance between the ball thrust bearing and the rear plate against which it operates. The position of the clutch pedal can be adjusted by means of the set screw in the rear end of the clutch release rod. No oil or grease should be put on the discs. The clutch is lubricated by two grease cups, one located on the clutch release yoke pin and one on the clutch release bearing retainer, both of which should receive attention at least once every 500 miles. A few drops of oil applied to the pins on which the discs slide will prevent squeaking.

Dry disc clutches used on the other cars designated in the table are of similar design and their adjustments and overhaul are practically the same.

The oil type of disc clutch with cork inserts is used on the Hudson and Hupmobile. The driving discs, which are secured in the flywheel by four studs, are stampings carefully flattened and machined so as to slide freely on the studs. The driven discs are also stampings, but are thicker and have numerous holes in them; into these holes are pressed the cork inserts. The corks are first soaked in water to make them pliable, then they are forced into the holes by a spe-



Typical Dry Disc Clutch as Used on the Buick "Little Six."

cial machine. A considerable amount of cork is left projecting on either side of the disc and this is shaved off to leave about $\frac{1}{32}$ inch after the corks have thoroughly dried out, then the corks are ground flat on a surface grinder. In making a replacement of corks in a repair shop not properly equipped, the surfacing of the corks is usually accomplished by rubbing the disc on a piece of sand paper. The result is seldom satisfactory, as the corks are not flat and even and do not give the full bearing surface necessary in order to have the friction hold the power of the engine. It is absolutely essential that the corks be perfectly dry and show a full bearing surface. In order to ascertain that the corks have full bearing surface, rub them flat on a surface that has been covered with Prussian blue or lamp black, using a very thin coating. The greater the bearing surface obtained the longer the corks will wear and the less the spring tension necessary. The spring tension can be varied by putting shims, about the size of a 50-cent piece, at the back of the spring, thus compressing it more, making it shorter when the clutch is engaged. The cork inserts drive the clutch drum on which they slide and this sliding, or separating motion is facilitated and equalized by small coil springs interposed on studs on the flywheel between the driving discs.

Between each pair of driving discs, which are mounted on the four steel studs in the flywheel, are small springs. The purpose of these springs is to expand the clutch discs as the clutch spring pressure is removed and permit the driven cork faced discs to rotate between the driving discs freely. In assembling the clutch great care must be exercised or these little springs will slip out of place and becoming jammed between the revolving parts, cause the clutch to drag instead of releasing properly.

When the clutch unit is to be assembled ready for inserting in the flywheel, the clutch drum should be placed on the bench and a cork insert disc placed over it, then a plain disc,

then a cork insert disc and so on until all of the discs have been put on the drum. After all of the clutch discs have thus been assembled the assembly should be slowly slipped on the studs of the clutch cover, and as it is slipped on the studs a small spring should be placed on the studs between each pair of driving discs. The spring, ball thrust bearings and shims are then placed in the crankshaft and the clutch unit put into place. The cap screws fastening the clutch cover to the flywheel are usually sufficiently long to compress the clutch spring.

The Dry Plate Clutch.

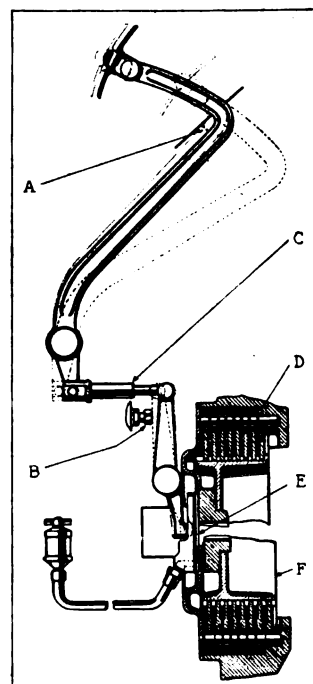
The dry plate clutch consists of one plate being clamped between two others, these two plates being the driving plates and the single plate being the driven plate. This type of clutch is used on the Paige and is encased with the flywheel by a bell house in unit with the transmission case. To disassemble this clutch it is first necessary to uncouple the propeller shaft, release the clutch and place a block of wood $1\frac{1}{2}$ inches high and four inches long between the cover and throw out yoke at point "B." Remove the clutch throw out yoke by taking out the cap screws at point "S" and next remove the cap screws around the bell housing and pull the transmission directly back. This will expose the clutch assembly. Place a block of wood opposite the other one at point "B."

At point "D" an "X" will be found to denote the old holes on the cover. This is to insure the cover going back into the proper place. Remove the cap screws around the cover so that this assembly can be removed. After removal this leaves the thrust ring and driving member exposed. The thrust ring "E" and one asbestos faced ring "H" can then be removed. Three drive pins "F" can be removed from the flywheel, which will allow the driving member and remaining asbestos ring to pull free.

If the asbestos faced rings are oil soaked wash them in gasoline and allow to dry before replacement. Set the driving member (K) and then the second asbestos faced ring. Tap the drive pin back into place. See that the thrust ring "E" slides freely on the three drive pins in the flywheel. If the edges are burred they should be dressed. This is very important. Inspect point "R" on the clutch cover to see that pins are free. Then start the clutch cover cap screws, of course getting the holes lined up properly. Then insert main drive gear "J" in place. The main drive gear may be kept for this purpose so as to save time in dismantling from transmission, as this is used for line up of the clutch only.

If after the clutch cover is tight it is sometimes necessary to loosen the adjusting screws "A" to allow the clutch

Pedal Adjustment on Typical Oil Disc Clutch with Cork Inserts, Used on Hudson Super Six: A, Clutch Pedal Must Be Adjusted So There is $\frac{3}{8}$ Inch Between Pedal and Bottom of Toe Plate; B, This Stop Is Provided for the Purpose of Limiting the Amount of Throw, So That Pedal Does Not Hit Toe Plate; C, Adjust Here in Conjunction with Clutch Pedal Stop; D, If Sufficient Throw-Out Cannot Be Obtained Through the Adjustments, an Earlier Separation of Clutch Discs Can Be Obtained by Placing $\frac{3}{32}$ Inch Washer on Each Driving Stud at This Point; E, Wear of Clutch During First 500 Miles Moves Clutch Collar Away from Clutch, Necessitating Freedom of Clutch Pedal so It Can Move Farther Up Through Toe Plate; F, Showing Clutch Fully Engaged.

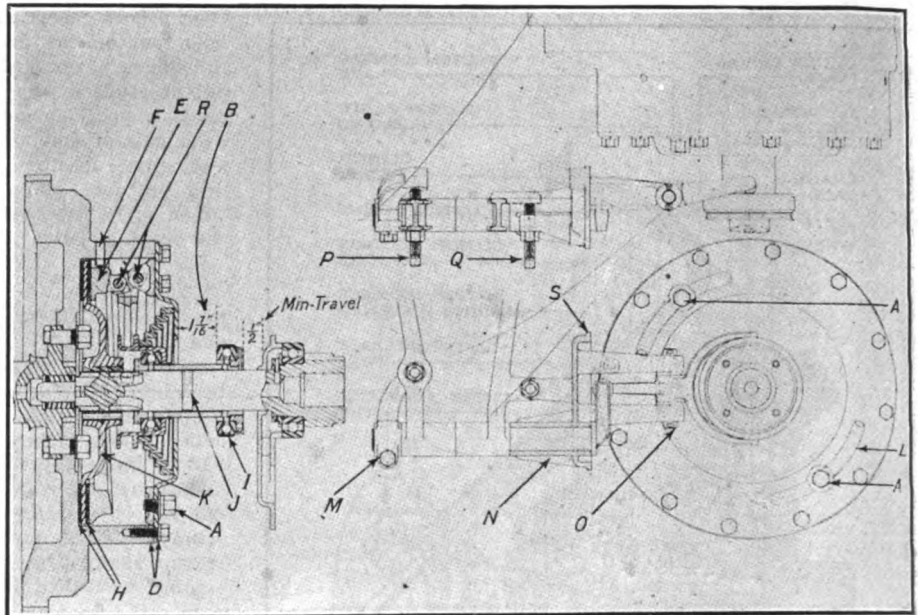


mechanism to shift to the proper line of holes. After the clutch cover is in place, tighten all cap screws, tap main drive gear from side so that it will slide free and properly line up. Remove the wood blocks and take out main drive gear and the transmission can then be set in place, clutch throw out yoke replaced and adjustments made.

Leave the asbestos faced rings loose in their working seats; do not fasten to the metal parts and do not run in oil. If the clutch does not work smoothly take out one adjustment screw and squirt about three spoons of oil in same, just enough to moisten friction rings. Too much oil will cause clutch to slip until oil is burned out.

In taking down the transmission the gear teeth should be carefully examined and if the gears have begun to shear off or burr at the edges they should be removed and the corners ground so as to eliminate friction as much as possible and be able to engage the other members with the least noise. These gears should be tested to see that they are firmly fixed to the shafts and all bolts, keys and pins are firm in their proper places. Looseness at these points not only causes noisy operation, but may result in a shearing off of the fastening from the constant hammering action of the loose members. After having drained the transmission for cleaning, it is a good plan to fill in about a quart of kerosene. This should be done with the motor running slowly and the drain plug out, so that the kerosene will flush its way through. This washes out a great deal of sediment which would ordinarily adhere to the walls of the transmission case.

A good rule to follow in the case of worn gears is to replace both the driving and the driven gears, if either is to be replaced, for the reason that if a new and a worn gear are run together the new gear is soon worn to conform with the old one. The essential points of wear in the transmission gearset are the bearings and the bushings. The bearings should be carefully examined and replaced by new if either of the ball races show signs of wear. The bushings should be removed if there is the slightest play between the shafts and the gears and replaced by new. For removing bushings a bolt with a washer on the end of it slightly smaller than



Sectional View of the Paige Borg & Beck Dry Plate Clutch and Operating Mechanism.

the outside of the bushing and a collar large enough to slip over the bushing can be used to advantage.

Hudson Super Six Gear Set as Example.

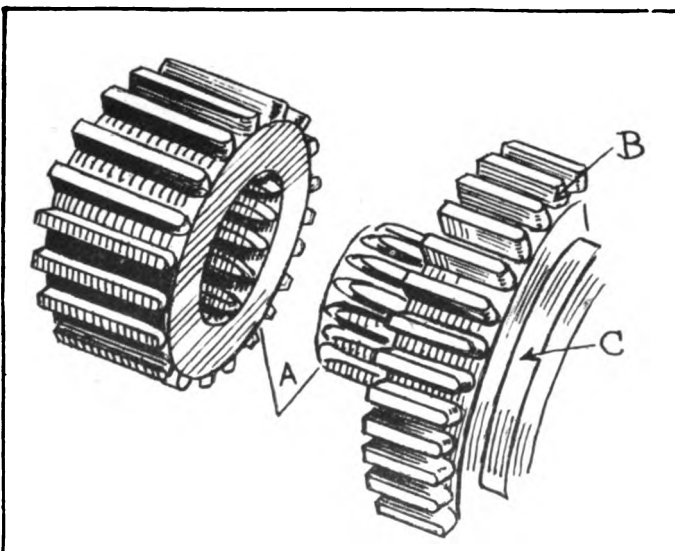
Herewith is given an illustration of the gear set of the Hudson Super Six, as a fair example of overhauling and adjusting a selective sliding gear transmission.

In removing the transmission from the engine, first disconnect the control rods and the universal joint and remove the gear change and emergency lever mounting from the top of the transmission. Then remove the bolts and cap screws which fasten the bell housing of the gearset to the flywheel housing, leaving the extreme top bolt tightened in position. After sufficient help has been obtained to insure proper management of this unit, unscrew the nut from the top bolt and draw the transmission back from the engine unit in an absolutely straight line until the pilot shaft has cleared the engine. To insure lining up of this unit while being removed the top bolt should be left in place, acting as a guide. If proper precautions are not taken there is great danger of straining or bending the pilot shaft.

The disassembly of the transmission is a simple matter. The universal joint flange, which is retained by a lock nut and keyed to the shaft, is first removed. Then the bearing covers on both ends of the main and counter shafts taken off. The removal of the main shaft covers will permit the taking out of the pilot shaft, as well as the driving gear. The rest of the sliding gears will then slide from the main shaft as that member is taken out from the rear. After the main shaft has been taken out the two counter shaft roller bearings are removed and the countershaft with gears attached can be lifted out from the inside of the gearset. The reverse idler gear, which runs on a roller bearing, can be removed when the stud has been removed from the rear. This stud is held in place by the countershaft rear bearing cover. Unless the countershaft gears show signs of wear and require replacement, they should not be removed from the shaft. These gears are all keyed to the shaft and may be removed by means of a wheel puller. End play of the countershaft should not be more than .012 of an inch and may be adjusted not closer than .004 of an inch by the insertion of shims between the front bearing cap and the roller bearing.

An allowance of .007 of an inch and .004 minimum is made for end play of the main shaft. Excess play in this member is compensated for by the removal of shims from between the rear main bearing retainer and the housing. If all the shims are removed and the play is more than .007, the bronze or steel thrust washers should be replaced with new.

In the illustration the thickness of the shims and their symbol numbers are given. In order to get the full advantage of this adjustment, one should always have a stock of



Worn Transmission Gears: A, Worn Teeth That Cause Loose Engagement; B, Burred Teeth That Cause Clashing; C, Worn Shift Yoke May Cause Teeth to Rub.

such shims, as there may be occasion for renewing them at any time. The split shims should not be thrown away, as they may be used again after flattening.

The excessive wear on the second speed gears soon changes the correct shape of the teeth and the second speed begins to fly out when climbing hills. This frequent slipping out of speed wears the gear teeth on an angle and sometimes damages the ballstop or interlock plunger on the gear shifting rods. The only remedy is to replace the gears and properly adjust the end play of the main shaft. Strengthening the interlock spring will do no good, as the gear teeth are worn on such an angle that the actual tendency of the power transmitted through the gears is to force them out of mesh.

Adjustment of the Atwater-Kent Ignition System.

The cars using the Atwater-Kent ignition system are the Maxwell and the Hupmobile. Following are the adjustments on this system:

In all ignition systems having a distributor unit with breaker box integral, there are a few adjustments that should be given careful consideration. The Atwater Kent contact maker, or interrupter mechanism, consists of a cam or notched shaft upon which rides a lifter bar. Resting against the lifter bar is a latch, which presses against a contact spring. The contact spring is made in two pieces, one of which, called the tongue, is fitted with a platinum contact designed to register with a platinum contact screw, which is insulated from the base of the box.

As the lifter bar rides upon the notched shaft it presses against the latch and the contact points are brought together, forming a circuit (if the switch is closed) between the battery, through the coil and to the ground. As the notched shaft revolves the lifter bar drops into one of the notches and the contact between the platinum points is broken. This action sets up an induced current in the secondary windings of the coil and a spark is carried to the distributor and from thence to the firing cylinder.

With the lifter bar resting in one of the notches of the shaft the distance between the platinum points should be between .010 and .012 of an inch. As the shaft is turned and the lifter bar rides to the top of the shaft, and the points come together, the tongue of the contact spring should separate from the spring hook about .012 of an inch. This assures the contact of the platinum points.

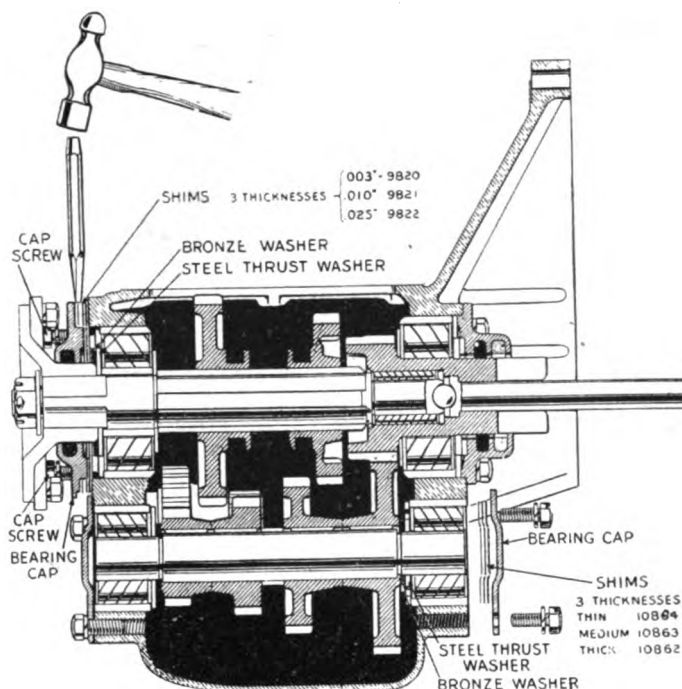
The latch mechanism, as well as the lifter, should be oiled frequently, care should be used, however, not to get oil on to the contact points. The contact points should be smooth on the faces and fit squarely together or the contact will be poor.

The distributor cap, or inside of the head, should be wiped with a cloth and if the contacts show signs of being burned the cap should be replaced with new. The contacts should be smooth and of a reddish brown color. A very small amount of vaseline may be wiped across each contact for lubrication if necessary. Too much lubricant must not be used, simply enough to dampen the end of the finger is sufficient for this purpose. The switch must be thrown to the "off" position while the car is stopped or continued battery charge may result.

Adjustments of the Remy Ignition System.

This system consists of the combined timer and distributor unit, a coil and switch. It operates on the closed-circuit principle and has but two moving parts, the cam and the breaker arm. The system is made for four, six and eight-cylinder engines.

The rotation of the cam causes its corners to come into contact with the fiber plug riveted to the breaker arm that is lifted, separating the contacts. Only hand advance of the breaker mechanism is provided. The entire mechanism is stationary; advancing or retarding the spark does not move any of the wiring. The distributor mechanism consists of a Bakelite cover, with terminals molded in place. There is no wiping of the contact, the spark jumping from the radial distributor arm to the terminals, thus eliminating wear. A miniature resistance coil is mounted on the top of the coil, in series with the primary winding, which is intended to protect the winding in case the engine remains idle for any length of time, with the switch closed, preventing excessive drain on the battery.



Adjustments on Sliding Gear Transmission. Example—Hudson Super Six.

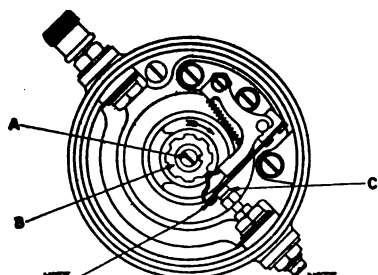
Remy adjustments: The contact points, under ordinary conditions, should not require adjustments more than twice in a season. They should be filed with a fine flat file to give them perfectly smooth surfaces. The contact points are adjusted with the wrench provided, so that the maximum opening is .020 to .025 of an inch. The rebound springs should be at least .020 inch from the breaker arm when contacts are at the maximum opening. The spark plug gaps should be .025 to .030 inch. If the engine misses when idling the gaps of the plugs should be wider.

Before finally coupling the generator shaft the ignition timer should be properly set. Remove the distributor cap and turn the generator shaft in a counter clockwise direction until the distributor brush is directly beneath the terminal to which is connected the wire from number one cylinder spark plug. Turn the shaft back or forward slightly to the point where the breaker points are just separating. Next turn the flywheel over until both valves in number one cylinder have closed and the mark U. D. C. 1 and 4 is at the top, then couple the generator to the drive shaft. With the spark lever fully retarded the breaker points in the timer unit should separate at dead top centre of the firing stroke.

Timing the Delco Ignition System.

Timing the system on the Buick: Fully retard the spark lever on the steering wheel. Turn engine to seven degree mark (approximately one inch from the dead center mark) on the flywheel, with No. 1 cylinder on the firing stroke. Loosen screw on center of timing mechanism and locate the proper lobe of the cam. Turn until the rotor brush comes under the position which No. 1 high tension terminal on the distributor head occupies when the head is properly located. Set this lobe of the cam so that when the back lash of the distributor gears is rocked forward the contacts will be open and when the back lash is rocked backward the contacts just close. Tighten the screw and replace rotor and head. The shaft runs clockwise when viewed from the top, and the spark occurs when the contacts open.

To time the Hudson-Delco, follow above instructions, except place spark lever at the top of the quadrant and place No. 1 cylinder piston as follows: No. 1 cylinder is due to fire in advance position when the mark A on the flywheel reaches the pointer attached to the crank case. This can be observed through the inspection hole on the flywheel housing, left side of engine. Mark A is $\frac{1}{2}$ inch before top center. (Top center is marked D-C-1 and 6.)



To time the Delco on the Dodge: The Delco distributor is on the right side of the engine, driven by the water pump shaft, at one-half crankshaft speed. The firing order is 1, 3, 4, 2. Spark plug gaps are $\frac{1}{32}$ inch, or about the thickness of a smooth dime. Slowly turn over the crank until

piston No. 1 has passed the top of this stroke about five degrees, about $\frac{5}{7}$ inch, passed the dead center marked on the flywheel. This position can be determined without removing the cylinder head, by turning the starting crank handle until the exhaust valve in cylinder No. 4 just closes. Remove the distributor head and distributor rotor and loosen the breaker cam adjusting screw on the top of the vertical shaft. Then set the breaker cam in such a position that the rotor button will come under the position of No. 1 cylinder high tension terminal in the distributor head, when it is replaced on the breaker cam, and so that the timing contacts are just starting to open with the spark lever in the fully retarded position. Set the breaker cam carefully so that when the slack in the distributor gears is rocked forward the timing contacts will open and when the slack is rolled backward these contacts will just close. With the vertical shaft in the proper position in reference to the engine, and the breaker cam and distributor rotor both set as instructed, the timing adjusting screw should be screwed down tightly. Then replace the rotor and distributor head. See that rotor button spring allows the button to be fully depressed and that the distributor head is located properly by the locating tongue that snaps onto it. Be sure that the distributor base is bolted down securely and that the drive shaft lines up truly with the water pump shaft, as this is an important adjustment.

Delco-Cadillac Timing.

To time the Delco-Cadillac: The distributor and timer are carried on the front end of the generator and are driven through a set of spiral gears attached to the armature shaft. The distributor consists of a cap or head of insulating material, carrying one high-tension contact in the center, with eight similar contacts spaced equi-distant about the center, and a rotor which maintains constant communication with the central contact. The rotor carries a contact button that serves to close the secondary circuit to the spark plug in the proper cylinder. Beneath the distributor head and rotor is the timer. The timer cam is provided with a lock screw in the center of the shaft.

The timing operations are: First open the compression release cocks on the cylinders and crank the engine by hand until the piston in No. 1 cylinder is on firing center. (No. 1 cylinder is the one nearest the radiator in the left hand block of cylinders.) Then remove the distributor cover, also the rotor, and loosen the screw A in the cam B (see illustration), just enough to allow the cam to be turned by hand after the rotor is fitted. (The lock screw should not be loosened enough to allow the cam to turn on the shaft when the engine is cranked by hand.) Next move the spark lever to the extreme left on the sector and replace the rotor. Then turn the rotor by hand until the distributor brush is under the terminal marked No. 1 on the distributor cover. (If the timer is only slightly out of adjustment, this will be unnecessary.) Replace the distributor cover. Then switch on the magneto ignition, hold the high-tension wire to the spark plug in No. 1 cylinder about $\frac{1}{4}$ of an inch away from the cylinder casting and turn the engine slowly by hand in the direction in which it runs. Stop turning immediately a spark occurs between the wire and the cylinder casting. If the cam is properly set, a spark will occur when the center line on the flywheel for No. 1 cylinder has passed the pointer attached to the crank case one-half inch. If a spark occurs before this the cam should be rotated slightly in a counter clockwise direction to correct the adjustment. If the spark occurs later than this the cam should be rotated in a clockwise direction. After

the adjustment has been made properly, be sure that the cam is locked securely to the distributor shaft by the lock screw. It is a good practice to recheck the timing after the adjustment is locked. To get the best results contact points should be cleaned and readjusted every 4000 or 5000 miles. Do not file the contact points: To clean them, simply rub them over an oil stone two or three times. Then replace and adjust according to instructions given. The firing order of the Cadillac engine is 5, 2, 7, 1, 8, 3, 6, 4. No. 1 cylinder is the one nearest the radiator in the left block and No. 5 is nearest the radiator in the right block. This is the order in which the secondary wires should be connected with the distributor cap.

Connecticut Ignition System.

Timing operations on the Chevrolet: Rotate the flywheel until the No. 1 intake valve begins to open. Piston No. 1 is then at "top center." After removing the spark plug and inserting a screw driver or rod, continue to rotate the flywheel until the piston is again at "top center," which is at the top of its compression stroke and gasses will be compressed ready for firing. Turn on switch and as in starting slip the igniter on the shaft and connect the wires to their proper plugs, then remove the No. 1 wire from the terminal socket on the distributor case and hold it about $\frac{1}{4}$ inch away from the brass ring of the socket. Rotate the entire igniter assembly on the shaft, in a clockwise direction, until a spark jumps from the end of the spark plug wire to the brass ring of the terminal. The igniter set screws should then be tightened and the No. 1 wire inserted in its socket. Setting is made with spark lever retarded and the firing order of the cylinders is 1, 2, 4, 3.

Timing Connecticut-Overland Ignition: The break in the timer should occur (with spark lever fully retarded), at the instant the flywheel is one inch past the upper dead center mark of the cylinder in which the spark occurs. The timing operations are: Turn the engine over slowly by hand until the mark on the flywheel 1 and 4 D-C is one inch past the punched indicator marks on the rear end of the cylinder block, just after the completion of the compression stroke of the engine. To determine that the piston is in this position, watch the operation of the intake valve of the No. 1 cylinder, which may be most easily done by removing the spark plug in the cylinder head over the No. 1 cylinder. By putting a screw driver through the opening and allowing it to rest on the valve head at the time the engine is being turned over the action of the valve can be readily determined. After it has reached the bottom of its travel turn the engine over approximately one-half turn until the 1 and 4 D-C mark on the flywheel is in the position given above. Then so mesh the timing gears with the timer drive gear that the points in the breaker box just start to separate, and the rotating unit of the distributor is in line with the wire terminal which leads to No. 1 cylinder. The firing order is 1, 3, 4, 2. The wires are then connected from distributor to spark plugs in their proper order.

In a general overhaul of the power plant of any car the exhaust pipe and muffler should be thoroughly cleaned of any accumulation of carbon, as any partial obstruction of the exhaust pipe or muffler may tend to cause back pressure on the firing of the motor.

THE CHASSIS OVERHAUL

Will be published in the June 25th issue of the Automobile Journal, which will also include the Accessories Directory, illustrating and describing hundreds of the most useful and desirable accessories and parts. The chassis overhaul will cover, in detail, the adjustments and overhaul of rear axles, the several different types of steering gears and other mechanical attentions that should be given the motor car frame and running gear. It will complete the general overhaul applicable to the 15 cars designated as examples in this issue.

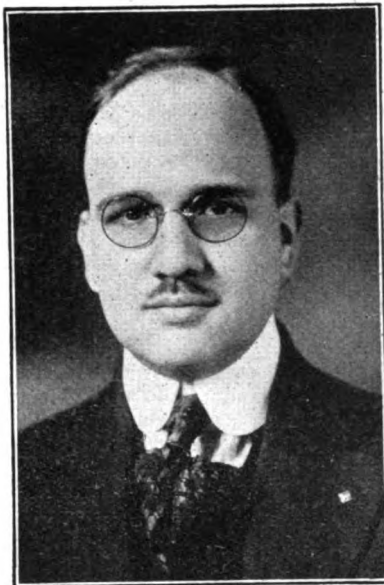
Personal News of Motor Industry in Brief

H. J. Woodward, general sales manager of the Republic Rubber Corporation, has announced that L. E. Browning has been appointed district manager in the mountain states of Montana, Idaho, Utah, Wyoming, Colorado, Arizona and New Mexico, with headquarters at 1564 Broadway, Denver, Col. Prior to this Mr. Browning was connected with the Kansas City branch of the company and had charge of the sales end of the Mechanical Rubber Goods in that territory.

J. H. Barnett has been appointed advertising manager for the Parry Manufacturing Co., Indianapolis, Ind. Mr. Barnett was formerly associated in advertising work with the Prest-O-Lite Co., the Swinehart Tire and Rubber Co. and the Firestone Tire and Rubber Co.

W. C. Boulcott has been made advertising manager of the Dayton Engineering Laboratories Co. Early in his business career he was a special service representative of the company. Later he was recalled as assistant service manager. His record in this position caused him to be selected as manager of the Chicago branch of the United Motors Service. He left that company to join the Cadillac Motor Car Co. organization and from this connection he returns to the Delco as advertising manager. Mr. Boulcott's experience both in the service field and in the sales departments of these organizations has fitted him admirably to take up the work in the advertising department.

Fred J. Miner is now district representative of the Duplex Truck Co. of Lansing, Mich. His territory consists of the southeastern states. Mr. Miner assisted in the early development of the Duplex when the company's factory was located at Charlotte and is one of the auto truck industry's pioneers. He was also formerly connected with the Olds



J. H. Barnett, Advertising Manager
Parry Mfg. Co., Indianapolis, Ind.

Motor Works of Lansing and the Cadillac Motor Car Co. of Detroit.

A. R. Demory has become vice president and general manager of the Timken-Detroit Axle Co., Detroit, Mich., taking the position made vacant by Eugene W. Lewis, who has resigned. Frederick G. Gilbert, secretary, will become vice president in charge of sales and advertising, and C. W. Dickerson, treasurer, to become secretary and treasurer.

Archer A. Landon, vice president of the American Radiator Co. and well known in the manufacturing world, is now head of the Production Division of the Aircraft Production Board. More than 20 years ago he joined the American Radiator Co. as a machinist and after a few years was appointed manager of the smaller plants. Later on his promotions made him assistant general superintendent of plants. Three years ago Mr. Landon was elected vice president of the company in charge of production.

F. B. Stearns, chairman of the board of directors of the F. B. Stearns Co., is president and treasurer of the Stearns Aero Parts Co., recently organized in Cleveland, O.

W. P. H. Reilly has been promoted to the position of general sales manager of the Globe Rubber Tire Manufacturing Co. Since last January he has been special representative of the company. Previous to that he was Pacific coast sales manager of the Ajax Rubber Co.

H. W. English has been made district sales manager of the Columbia Motor Truck and Trailer Co., Pontiac, Mich., for the Pacific northwest. He has been associated with the Republic Motor Truck Co. in the same territory.

J. D. Ertel, who was formerly office manager of the Minneapolis branch of the Kelly-Springfield Tire Co., has been appointed office manager of the New York branch.

R. Scott Smith, formerly district manager of the Federal Motor Truck Co., Detroit, has joined the Standard Motor Truck Co., Detroit, as district representative.

Louis N. Gay has become associated with the William R. Johnston Manufacturing Co., Chicago, as manufacturers' advisor on the construction and design of tops. For 12 years he was head of the Consolidated Auto Top Co., Cleveland.

Charles S. Pike has been appointed truck sales manager of the Paige-Detroit Motor Car Co., Detroit, Mich. He has been succeeded as Washington Paige representative by Frank Caulk, formerly with the Aluminum Castings Co., Detroit. Mr. Pike was formerly sales promotion manager of the company.

A. W. Sidell has returned to Madison, Wis., having been away 3½ years as European representative of the Gisholt Machine Co. He will be stationed at the factory.

B. C. Wilson has joined the advertising department of the Miller Rubber Co., Akron. He was formerly connected with the Associated Press in Detroit and the Martin V. Kelly Co., Toledo.

George Reason, who is well known in the automobile business of Detroit, has become interested with the W. D. Block Motor Co., distributors for Oakland and Marmon automobiles, and has been appointed sales manager. Mr. Reason first started with the Cartecar company and had charge of their retail business until they discontinued in 1915. He organized the Reason Auto Sales Co. and operated the garage and sales for Allen and Paterson cars and in 1917 sold out and went with Radford Block Co., 1225 Woodward avenue.

J. D. Wilson has been appointed chief engineer of the carriage division of the Packard Motor Car Co., succeeding G. H. Bridle.



W. C. Boulcott, New Advertising
Manager of Dayton Engineering
Laboratories.

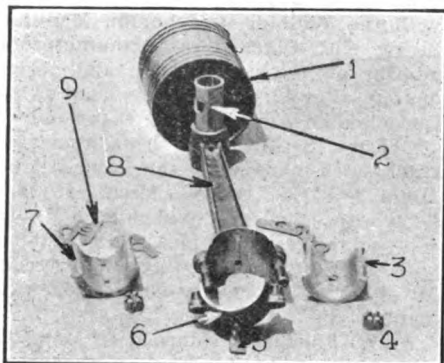


Walter J. Bemp, Head of Bemp-Robinson Co., New President of Detroit Automobile Association.

OVERLAND 79

(For Practices of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

THE design of the Overland car has been changed to a certain extent, from year to year, and so though alike in general construction models affected by the advance of modern construction will show some variation in parts.



Piston and Connecting Rod Parts: 1, Piston; 2, Wristpin Bushing; 3, Lower Connecting Rod Bearing; 4, Cap Nut; 5, Oil Scoop; 6, Cap; 7, Upper Connecting Rod Bearing; 8, Connecting Rod; 9, Shims.

Manifestly it would be impossible to take up, in one article, the different types of Overland cars, so that this paper will deal mainly with the model 79, which is perhaps the one most typical of the average Overland used car.

The model 79 engine is of the L head type, the cylinders are cast separately and the heads are integral with the cylinder blocks. The crank

case is made in two parts, the lower being removable, thereby giving access to the crankshaft and connecting rod bearings.

The removal of the manifolds while the valves are being ground in is not essential. Both manifolds are held on by the same set of four manifold yokes, and after the fuel line and exhaust connections have been removed the nuts which hold the manifold yokes into place should be loosened, the yokes turned and the manifolds removed.

Preliminary to Work on Engine.

Disconnect the secondary wires and remove the inlet and exhaust valve plugs, leaving the spark plugs and priming cups in place in the plug.

Before fitting a new fan belt (if a new one is necessary) the eccentric upon which the fan bearing is mounted should be turned so that the fan is at its lowest point. As the belt stretches the fan eccentric may be turned so as to bring tension upon the belt.

The tappets or push rods are of special design, an Overland feature. The push rod is square, one end being rounded to rest against the camshafts, the other or upper end being fitted with an adjusting screw and lock nut. By design, then, the push rod assembly may be removed for replacement very readily. The method is to unscrew the push rod guide yoke stud nut, turn the yoke one-quarter way around and lift the push rod dust cap and guide from the crank case. When there is play between the rod and bushing excessive oil leakage results, therefore the bushing pinned into the dust cap should be replaced if the babbitt is worn. Ultimately, in replacing the push rod assembly, the rounded portion must be set across the cam or the rod dragging against the cam will cause excessive wear.

Removing Oil Base.

The lower part of the crank case, comprising the oil base, is removed by disconnecting the oil tubing to the sight feed oiler and taking out the 12 retaining bolts which fasten the base to the upper part. When the base is dropped from the engine the oil pump shaft will separate at the Oldham coupling.

The gear oil pump is fastened to the lower part of the crank case near the flywheel. Through a rectangular hole in the case oil is drawn into a gauze strainer and thence to the pump. This gauze should be examined carefully and if it is worn or broken replaced with new. Next the three oil pump cap screws may be removed and the top of the pump taken off, permitting the examination of the pump gears. Under

ordinary conditions the life of the pump and gears is considerably longer than the life of the engine, and the only part requiring attention is the gauze.

In replacing the pump cap and the pump body the surfaces should be carefully scraped and a gasket of manila paper or cork made to fit the surfaces. The gasket should be given at least two coats of orange shellac and allowed to dry. It should then be coated with shellac again and put into place while wet.

The connecting rod bearings are removed by unfastening the caps and driving the babbitt from the holders. When new babbitts are put into place they should always be scraped or reamed to fit. An easy method of lining up the pistons is by putting the pistons into place one at a time.

When new babbitts are to be put into place the oil feed hole which is in the cap part of the bearing should be inspected. If this hole is stopped up or does not register with the opening in the cap, a drill should be put through the babbitt to insure an oil channel. The crankshaft rotates from left to right, or clockwise. It will be noted that on each connecting rod cap is fitted a small oil dipper. The hollow part of this dipper should be on the right side of the cap facing the front of the engine, so that the rotation of the crankshaft will cause the oil to be scraped from the pans.

The wristpin is held into the piston by a set screw, which, in turn is kept from turning by a cotter pin. In case there is any play in the wristpin it should be removed and either it or the bronze bushing renewed. The lubrication of the wristpin is through the ends, and by splash caught in a square hole in the bushing. The holes in the wristpin should be carefully cleaned. When the pin is returned the cotter pin should be reinserted or great damage may be done the engine.

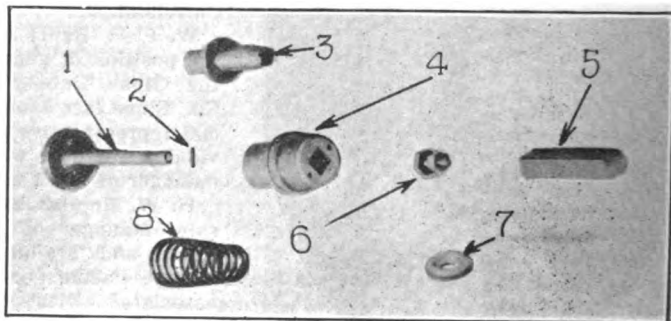
The lower parts or caps of the five main bearings may all be renewed, but to renew either of the upper parts, the crankshaft must be removed or dropped about one inch. In case the bearings are to be renewed the crank case should be removed from the chassis.

Taking Units from Chassis.

Before the crank case is removed from the chassis the starting motor and the generator should be removed. These units are held in place by a strap, which is clamped at two points, one above the starting motor and one below the generator. The wires should be marked and the motor and generator terminals tagged. To facilitate the work and avoid breakage the magneto should also be unbolted from the base and removed.

The radiator is supported upon two bearings at the side and reinforced by a stay rod. After the stay rod and the caps which hold the two journals to the frame have been removed, the radiator may be lifted from the chassis.

The engine is supported upon and fastened to the chassis at three points, and is fastened besides to the propeller shaft.



Valve and Tappet Components: 1, Valve; 2, Valve Pin; 3, Valve Stem Guide; 4, Push Rod Guide; 5, Push Rod; 6, Push Rod Cap Screw Assembly; 7, Valve Spring Cup; 8, Valve Spring.

When the two bolts which hold the propeller shaft spacer to the clutch cone, likewise the two bolts which hold the crank case to the diagonal frame members, have been loosened and the nut is removed from the stud which passes through the front cross member between the oil base or crank case lower section and the timing gear housing, the engine may be slipped forward about one inch and lifted from the chassis.

When the engine is removed in this way the clutch will be removed with it. If it is desired to remove the engine only, instead of removing the two bolts holding the propeller shaft spacer to the clutch, the nuts on the ends of the clutch adjusting studs should be removed and the springs and washers taken off. The clutch cone will then be left in the chassis.

The camshaft, with the timing gear and bearings, may be removed from the engine by unscrewing the four screws in the center bearing and removing the cap, then taking out the set screws which hold the bearings into place and driving against the shaft with a wood block. The bearings will then be forced through the front of the crank case.

Treatment of Clutch Assembly.

After the engine has been removed from the chassis the clutch cone may be removed, if it has not already been done, exposing the clutch adjusting spider, which is mounted on the flywheel bushing, and retained by the clutch thrust bearing assembly, which in turn is held upon the shaft by the clutch locking ring. The clutch locking ring is first removed by expanding it and slipping it from the bushing. The ball bearings and spider may then be removed.

The flywheel bushing is fitted into the flywheel and clamped between the crankshaft flange and flywheel. To remove it the flywheel bolts must be taken out and the flywheel removed.

The clutch cone should be slipped back upon the crankshaft and should there be any wear, as will be evidenced by play between the cone and the crankshaft, the cone should be rebushed. If a new bushing is put into place one should take particular care to bore the grease hole in the new bushing after it is in place.

When replacing the clutch assembly it should be assembled on the shaft in the flywheel before it is put into the chassis. The clutch springs, however, may be left until the assembly is in the car and compressed by using a Y iron and a length of wire, rope or bent rod, attached to a convenient frame member, or the flywheel.

Unit Transmission System.

The transmission gearset and rear axle form the unit transmission system and to make repairs on either of these units they should be removed from the car together.

Both the foot and emergency brake rear rods should be disconnected from the rear axle and the speed rods taken off. The cotter pins should be taken from the torsion tube yoke pivot pins and the pins removed from the yoke, allowing the yoke and propeller shaft housing to hang free. Then the nuts on the spring clips which fasten the springs to the rear axle should be removed.

The chassis should then be lifted free of the axle and supported by two horses, thus allowing the axle to be drawn from beneath the car. The propeller shaft spacer may be slipped from the universal joint and the latter may be taken from the propeller shaft after the retaining pin is removed

with a punch or drift.

Examining Universal Joint.

A careful examination should be given the universal joint and new parts be substituted for worn parts. The torsion tube should be unbolted from the transmission gearset and the propeller shaft drawn from the housing.

The torsion tube assembly consists of three pieces, which should be firmly riveted together. If either the yoke or the flange are loose on the torsion tube they should be riveted and welded if possible. Since the torque is through this member it is essential that it be firm.

The upper or front end of the propeller shaft rotates in two bearings. Both of these bearings should be examined and should there be any play between the shaft and the bearings the bearings should be drawn out and replaced. If this is not done there will be a continuous strain upon the propeller shaft.

The transmission gearset is fastened to the rear axle by six studs. After the nuts on the studs have been removed the gear box, with the pinion gear, may be removed and disassembled.

Shafts and Bearings.

Both the main and counter shafts are mounted on ball bearings. The main shaft is in two pieces, one of which carries the main drive gear; the other, or rear part, carries the second and high, also the low and reverse sliding gears.

The rear ball bearing retaining screw is first removed and the ball bearing driven from the inside with a bar of iron or piece of wood. With the bearing will be drawn the shaft carrying the pinion gear.

Before the front part of the main shaft can be removed the propeller shaft coupling must be pulled from the shaft and the main drive gear lock nut unscrewed. The gear and shaft may then be drawn into the case and removed. The ball bearings, with their outer races, may be driven out of the case if replacement is necessary.

Both the countershaft ball bearings are held in place by retaining caps. The cap screws should be removed and the bearings driven out. The shaft can then be slipped through the back of the case, leaving the three gears inside the case.

The transmission reverse idler shaft is held into the case by nut on the end of the shaft. After this nut has been taken off the shaft may be removed and the double gear taken out of the case.

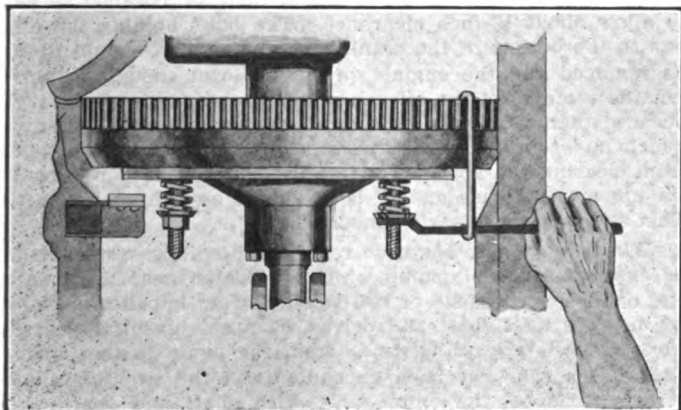
Before reassembling the gearset, one should assemble the pinion and drive shaft with the ball bearing in place, putting the correct number and sizes of liners between the bearing race and the shoulder on the shaft, so that there will be no play between the bearing and the shaft assembly.

Rear Axle and Differential.

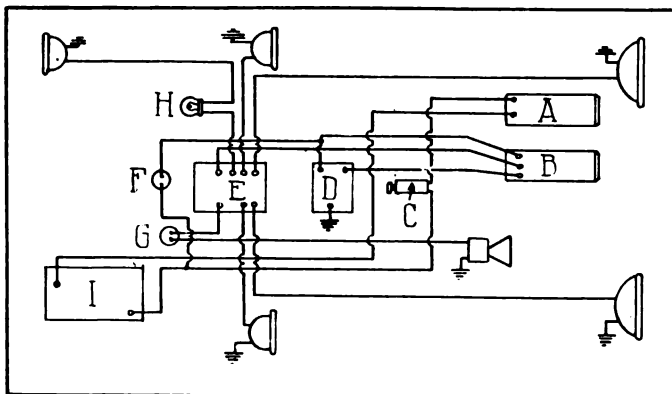
The rear axle is of the three-quarter floating type and the axles and differential may be removed without disassembling the housing.

The steering gear is of the worm and worm wheel type. The cover over the worm wheel should be removed and the gear and worm examined.

The starting and lighting system is entirely separate from the ignition system.



Using a Y Iron and Bent Rod to Compress Clutch Springs.



Overland Wiring Diagram: A, Starting Motor; B, Generator; C, Starting Switch; D, Cut Out; E, Switch and Junction Box; F, Ammeter; G, Horn Button; H, Dash Light; I, Storage Battery.

DODGE

(For Practices of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

THERE have been but few radical changes in the Dodge Brothers car since its first appearance and it is the purpose of this article to cover practically all of the models now in use. Aside from a slight change in the gasoline and ignition systems, the engine remains practically the same as originally designed. It is of the removable L head type with the intake manifold cast integral with the cylinder block.

The first step in the overhaul is the draining of the water and removal of the radiator, which is held to the frame by two bolts, one upon each side of the center. The water hose connections should be unclamped and removed. The secondary wires should next be marked with tags and disconnected from the plugs. After the secondary wire retaining fiber has been unfastened, the distributor cap with wires may be lifted from the distributor and the secondary assembly removed from the car. Where the engine is equipped with the Delco system, the wire leading from the distributor to the coil must be removed before taking off the distributor cover. In every case the greatest care must be observed not to loosen the distributor brush.

The gasoline should next be drained from the vacuum system by removing the filter cap, which is located beneath the carburetor float chamber. This will allow all of the gasoline to escape from the vacuum tank and feed line. To drain the carburetor float chamber the gasoline needle valve cap, which is located at the top of the float chamber, should be removed and the needle valve lifted from its seat, allowing the escape of the gasoline from the carburetor. After the fuel tube from the gasoline tank and the control rods have been disconnected, the tank and carburetor may be unbolted and the whole assembly removed from the car.

Work on Engine Parts.

After the 14 nuts which fasten the cylinder head to the engine block have been taken off, the head may be removed from the engine, exposing the cylinders, pistons and valves. From these parts the carbon should be removed by scraping and washing with kerosene oil and a stiff brush.

The valves are fastened in the engine block in the conventional way by pins and washers. They are accessible by the removal of the two valve stem cover plates which are located below the exhaust manifold. The valve springs may be lifted by means of a valve spring lifter, the pins taken out releasing the washers and springs and the valves removed one at a time for grinding.

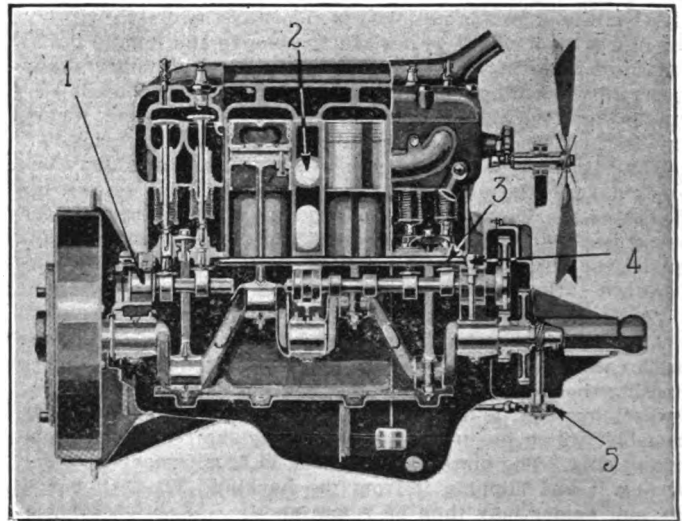
Magneto and Ignition.

After the wires leading to the motor-generator and magneto or coil have been tagged they should be disconnected. Both the magneto and Delco ignition systems are driven from the pump shaft and are driven through a flexible coupling. This coupling should be disassembled, the ignition unit unbolted from the base and then lifted from the car.

The fan belt adjustment is then loosened and the fan with the belt removed. The fan drive pulley is fastened to the shaft by a pin, and a key. The pin is driven out and the pulley pulled from the shaft with a wheel puller.

On the later cars the water pump drive gear is enclosed in a removable housing, while on the earlier cars the timing gear housing, together with the water pump gear housing, was cast in one piece. Where the engine is fitted with a removable water pump housing, the next step in the disassembling is the removal of the water pump, while in the earlier types the water pump should be left until the engine has been removed from the chassis.

Disconnect the water connection from the cylinder block by removing the nut which fastens the water fitting to the block, then remove the bolts which fasten the water pump to the crank case. Next remove the water pump gear housing, whereupon the pump with housing and gear attached may be taken from the engine.



Partial Cross Section of Engine: 1, Camshaft; 2, Intake Passage; 3, Valve Lifter; 4, Oil Pump Ball Check Valve; 5, Oil Pump.

The gear which drives the pump shaft is next pulled off and the water pump cover removed, exposing the water pump paddle. A careful cleaning should be given this unit. If the bushings which form the bearings are worn they may be replaced with new.

The motor-generator, which is driven by a chain and located on the left side of the engine, should next be removed. The clamp which fastens this unit to the engine should first be uncoupled and the chain inspection cover taken off. After the chain adjusting ring set screw has been loosened and the castellated binding nut on the starter removed, the eccentric adjusting ring may be turned so as to slacken the chain. With the chain slack the master link may be uncoupled and the chain removed. The motor-generator may then be removed from the engine.

To obviate any chance for breakage, the oil filler and breather pipe should be unbolted and removed, and the button which is on the top of the oil level indicator taken off.

Letting Down the Engine.

The oil tube which is coupled to the oil pump and extends to the upper part of the crank case on the outside front of the engine should next be disconnected at the pump, and, after the oil has drained from the system, the engine should be supported by a block and tackle, or by a bar passed through the carburetor intake passage and supported upon horses or boxes. The bolts which fasten the upper part of the crank case to the gearset should then be loosened so as to allow about $\frac{1}{4}$ inch clearance. The bolts holding the oil pan to the bottom of the crank case and gearset should then be removed and the engine slowly let down enough to permit the removal of the oil pan. This procedure is necessary because there is a small flange on the gearset bell housing, which under ordinary conditions keeps the rear of the pan from clearing the housing. After the pan has been removed the upper crank case-gearset bolts should be tightened again. This applies only to earlier models.

When the oil pan has been removed the oiling system will be exposed. The oil pump which is located near the front end of the pan consists of two vanes and an impeller mounted on a vertical shaft and driven by a set of spiral gears. After the oil tube which leads from the pump to the lower part of the case has been uncoupled and the two retaining screws removed, the pump body with shaft and gears attached may be taken off for examination. When the oil pump

is replaced the vanes should be placed with the spring between them, and so that the flat faces are in the direction of the rotation of the impeller.

The oil pan which is fitted with troughs into which the connecting rods dip should next be removed and the oil pan reservoir given a thorough cleaning.

All of the connecting rod bearings may be replaced without removing the connecting rods, since the babbitt is cast in two sections, which are removable. If the engine is to be removed from the chassis, however, the weight is greatly lessened by the removal of the pistons and connecting rod assembly at this point. The wristpins are fastened into the piston by a set screw and this end of the connecting rod is fitted with a removable bushing. In case of lost motion or play, it is always advisable to replace either the bushing or wristpin, or both, or a knock will be caused. When the wristpin set screw is replaced it should be pinned into place by a cotter pin, or damage to the engine will result.

Two methods of power plant removal are possible; the engine may be removed by itself, or the engine and transmission gearset may be taken out at the same time. The first method is to be recommended as being the most practical for the novice, since the weight of the full power plant is much greater than that of the engine alone.

If the engine is to be removed by itself, it should be supported by block and tackle, or by a bar passed through the intake passage, as before directed. The bolts which fasten the crank case to the transmission bell housing are next removed and the ball joint cover which retains the front engine member in the frame taken off.

Two types of clutches have been used on the Dodge Brothers car. The first 50,000 cars were equipped with a leather faced cone clutch, while the later ones were fitted with multiple disc clutches. In each type the clutch shaft is carried in a ball bearing which is fitted and retained in the engine crankshaft.

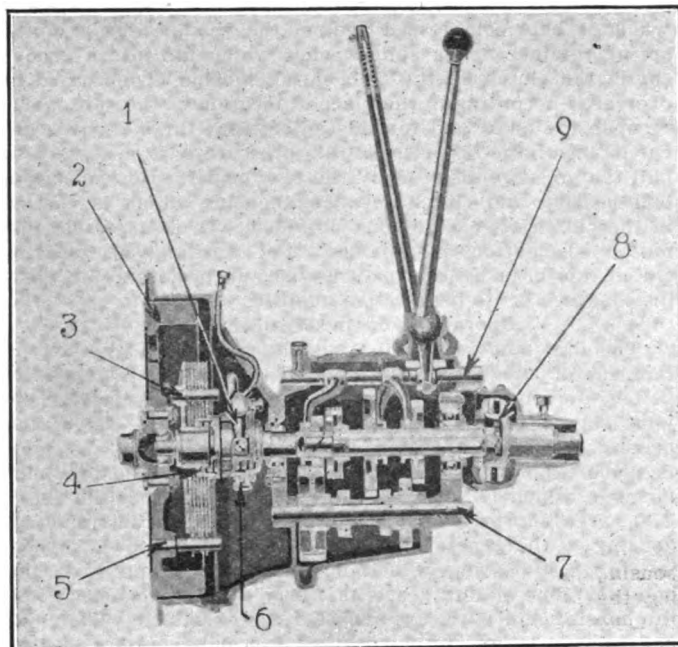
In the disc type clutch the wheel is fitted with three driving pins upon which are fitted the driving plates. When this type is being disassembled, the engine may be taken out without disturbing the clutch or shift fork.

Before removing the engine, however, the two bolts which fasten the bell housing to the frame must be taken out and the transmission slipped back slightly to allow clearance enough for the freeing of the engine in the front. The front is first lifted clear of the supporting member, then the engine is moved forward and up until it is free from the transmission gearset housing.

Where the full power plant is to be removed, the universal joint ball housing ring is unbolted and the top of the transmission gearset which carries the emergency brake and the speed change lever taken off. The brake rods and controls are then disconnected and the transmission gearset may be removed with the engine as above directed. When this has been done the gearset housing and clutch assembly may be removed from the engine in the same manner as directed for the removal of the engine alone. In lifting the complete power plant from the car the engine should be supported by ropes passing around it, rather than by the method recommended for lifting out of the engine separately.

After the engine has been removed, if the clutch is of the disc type, the removal of the flywheel, which is retained to the crank case flange by six bolts, is the next step. Where the clutch is of the cone type and has been removed with the engine the lock screw, which is located on the clutch spring adjusting nut, should be unscrewed and the nut backed off. It is a good plan to wind a piece of rope or cloth around the square end of the clutch shaft, just before the nut is ready to come off, and to unscrew the nut with a pipe wrench. The strong spring will force the nut off very quickly against the cloth, and one should be careful not to have one's fingers in the way.

In returning the spring assembly the spring should first be put into place, then the adjusting nut, and upon the nut a length of pipe. When pressure is brought to bear upon the pipe the spring is compressed and the nut may be turned into place and locked. After the clutch spring has been removed the drum may be slipped from the shaft, exposing the flywheel assembly, which is removed as directed above.



Sectional View of Clutch and Gearset: 1, Clutch Release Fork; 2, Flywheel; 3, Driven Disc Pin; 4, Clutch Spring; 5, Driving Disc Pin; 6, Ball Bearing Clutch Release; 7, Counter-shaft; 8, Universal Joint; 9, Shifting Shaft.

The next step in the disassembling is the removal of the timing gear case cover. Then the timing gears are exposed, as well as the motor-generator driving sprocket. On the removal of this cover from the older cars the pump gear may be taken off and the pump removed.

Unless the gears or sprockets are badly worn they need not be removed from either the camshaft or crankshaft, since the main bearing caps may be removed and the crankshaft taken out, allowing the removal of the camshaft without disturbing the gears.

To remove the gears from the crankshaft, the starting pin must first be driven out and the oil pump gear collar removed. The oil pump gear may then be pulled from the shaft with a wheel puller, as may also the starter chain sprocket. After the spacing collar has been removed from against the timing gear this gear may also be pulled from the shaft with a wheel puller. In reassembling, care must be used to get the spacing collars back to their proper locations.

The camshaft timing gear is screwed to a flange which is integral with the camshaft. When the six cap screws have been removed this gear may be taken from the shaft.

The camshaft is retained by a pin which fits in a groove cut in the center camshaft bearing. The pin in the older cars was held in place by a set screw, while in later models a spring is used. When the pin is removed the camshaft may be pulled from the engine.

If the clutch is of the disc type and still remains in the housing the clutch release fork should be removed as directed for the removal of the cone clutch: the clutch assembly may then be slipped from the housing and disassembled.

Disc Clutch Disassembly Described.

The disc clutch assembly is made up as follows: The shaft upon which the discs are assembled is fitted at the front end with a shoulder against which the clutch driven spider rests. This spider is keyed to the shaft fitted with three driven disc pins upon which the driven plates are carried, and has a smooth face against which the driving plates are clamped when the clutch is engaged.

Alternately on the spider are: First, a driving plate, which has three holes through which the flywheel driving studs fit, and which is faced upon both sides with wire-woven asbestos fabric; then a smooth driven plate fitting upon the clutch driven spider pins; the entire assembly ending up with a driving disc. Upon this plate assembly is placed the pressure disc which fits over the driven spider pins, and which carries a long hub with a shoulder on the front inside edge. Inside this hub and resting against the shoulder is the spring,

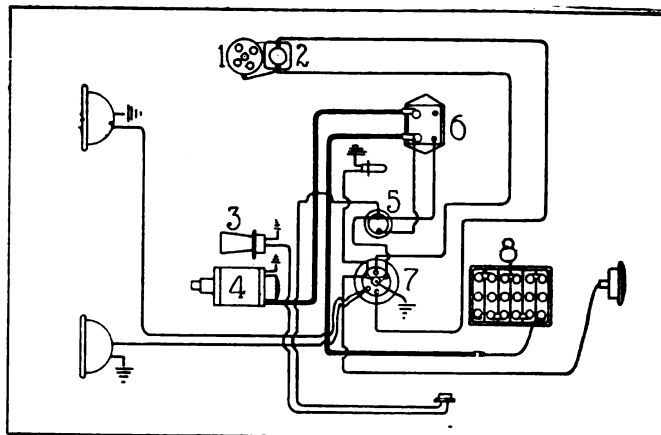
which is held compressed against the shoulder by a clutch spring retainer and a split washer which fits into a groove cut in the clutch shaft. The spring tension is increased or decreased according to the place of location of the split washer upon the shaft and for this adjustment three grooves are cut in the shaft. To release this pressure it is necessary to pull the pressure disc toward the rear, and for this purpose a ball bearing and clutch releasing housing which is carried in the clutch release fork, is provided. To disassemble this unit a special tool is provided. For washing the asbestos clutch fabric, turpentine may be used in preference to gasoline because of its penetrative qualities.

Operations on the Transmission.

The first step in the disassembling of the gearset is the removal of the universal joint. The joint is fastened together by four bolts. When these bolts are removed the joint may be disassembled, and the nut on the end of the driving shaft which fastens the front member of the joint in place exposed; this nut should be removed and the joint member, which is keyed to the shaft, pulled from the shaft. The three screws which fasten the front of the universal housing to the gearset case should then be removed, exposing the ball bearing, which may then be driven from the housing. The sliding gear shaft may then be removed from the housing and the gears and bearings examined. The front ball bearing is held in place by screws and a washer located inside the clutch bell housing. When these screws are removed this bearing may be driven out and examined. In driving out bearings of this type the blows should be struck against the outer race, since it is the outer race which is fastened into the housing. The countershaft is retained by a screw which is located at the back of the gearset housing. When this screw has been removed the countershaft may be

drawn out, leaving the four gears assembled inside the case, from which they may be lifted out. The two outside gears of the countershaft assembly are keyed and driven on to the reverse and low gear casting, which rotates upon the countershaft.

The reverse idler gear is mounted upon a bracket which is located on the left side of the transmission gearset and retained by six screws. When the bracket is removed the retaining pin may be taken out, allowing the gear and shaft to be disassembled.



Starting, Lighting and Ignition Wiring of the Later Dodge Brothers Cars: 1, Distributor; 2, Ignition Coil; 3, Horn; 4, Motor-Generator; 5, Current Indicator; 6, Starter Switch; 7, Ignition and Lighting Switch; 8, Battery.

Possibilities of Kerosene Carburetor

In a very interesting treatise on the practical application of a kerosene carburetor to the present type of automotive engine, the consulting engineer of the Findelisen & Kropf Manufacturing Co. of Chicago, makers of the Rayfield carburetor, states that the problem lies within the domain of the engine builder rather than the carburetor makers. Continuing, he says:

"It does not seem to the writer that the services which the carburetor renders will be any more difficult with kerosene alone than with kerosene plus a relatively infinitesimal quantity of gasoline which constitutes the present fuel. The services being largely proportioning the fuel, spraying it, partially evaporating it and delivering it to the manifold, and at that point the influence of the carburetor ceases. For that reason the makers of the Rayfield carburetor have given the kerosene carburetor only casual consideration.

"The only reason why kerosene costs less than motor fuel, from which it differs only in the fact that it does not contain any of the light fractions, is because of its comparatively limited use, and if its field were enlarged by a change in its composition, to permit its use in standard motors, or by the development of some carburetor to use it efficiently, its cost would mount to the price of alleged gasoline, because there is not enough of it, not already used in making motor fuel, to materially lower the price.

"The vaporization of kerosene is a question only of temperature, which must be maintained until the mixture reaches the cylinder. It can be introduced into the cylinder in a state of fog without so much heat, but the difficulties encountered in distributing a fog mixture uniformly are distressing. A device which will raise temperature without increasing the volume of a gas when under constant pressure is not within the scope of invention. It is a physical antagonism, so why waste good gray matter on it.

"If the expansion which is a corollary of sufficient temperature to vaporize kerosene is permitted, the engine will be large for developed horsepower, which is not desirable for portable engines using their own power to transport themselves.

"With water as a cooling medium and the consequent limit to cylinder temperature, the kerosene particles will coalesce under compression, no matter what form it is in when introduced into the cylinders, and the resulting leakage past the rings into the crank case and the washing away of the lubricant will be magnified.

"When the engine and carburetor experts get together, in company with an oil expert and a physicist, which four functions are rarely combined in one man, the problem of using the heavier fuel fractions alone, instead of a combination of the heavy and light fractions, may be worked out, provided it is worth while from an economic standpoint. We should like to be in such a conference, but to make it useful, we must not go to it with the prejudices of the uninformed laity as the moving spirit.

"Pardon the departure from the question, but it seems to be in order to suggest the soft pedal on a fuel, which at its best is about the worst, of which there is a certain unrenewed quantity that will give out some day, and begin to prepare for the future by advocating alcohol laws that will give us a cheap, clean, renewable fuel."

GARCO DATA BOOKLET GIVES VALUABLE BRAKE INFORMATION.

The multitude of different cars on the market and the consequent variations of size in brake lining needed for renewals has been successfully answered in a booklet just published by General Asbestos and Rubber Co. of Charleston, S. C., manufacturer of "Garco" Brake Lining.

Listed in this booklet is the name of practically every passenger and commercial vehicle manufactured. The different models of each are listed by year or number. As it now stands the data given regarding the number of pieces of brake lining, the length, width and thickness needed for renewal, is thoroughly up-to-date and it is the intention of the company to issue revisions from time to time as may be found necessary.

The Garco Brake Lining Data Booklet is of convenient size to be slipped into a vest pocket. It will be gladly sent free of charge to any dealer or repair man requesting a copy. A number of pages have been furnished blank for use in making memoranda and in all this booklet will be found of real, practical value to any one interested in the brake lining renewal business.

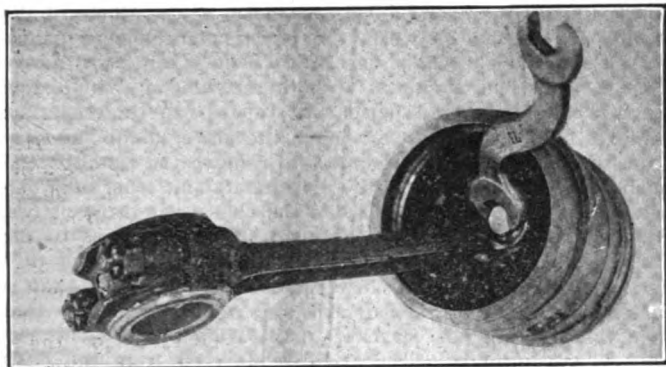
FORD MODEL T

(For Practices of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

IN PARTIALLY overhauling the Ford engine it is not necessary to remove it from the frame, but to overhaul the transmission gearset one must remove the cylinder block from the chassis before this unit can be disassembled. To determine whether the gearset is in need of repair it is not necessary to disassemble it. If the noise or grind is excessive, if the gears seem to be badly worn, a good plan is to take the engine block and gearset from the car and make all repairs on the engine and gearset at the same time.

Before beginning the work of repair you should make written notes of the relative positions of all parts, numbering and tagging them so that they can be replaced in order. Note the position of the timing gears of the engine, marking them with a punch (if they are not already marked), so that they can be replaced in their proper relation.

Drain the water from the radiator and remove the two bolts which hold the radiator outlet hose connection to the



Piston and Connecting Rod Assembly, Showing Method of Removing Wristpin Clamping Bolt to Free the Wristpin.

cylinder head. Next remove the secondary, or spark plug wires, and the 15 cap screws which fasten the cylinder head to the cylinder block. The head can then be lifted from the block, thus exposing the cylinders and valves. It is possible to grind the valves without removing the manifolds. The novice is not advised to do this, as some of the grinding powder might grip into the manifolds and later be drawn into the cylinders, scoring them and perhaps causing serious damage.

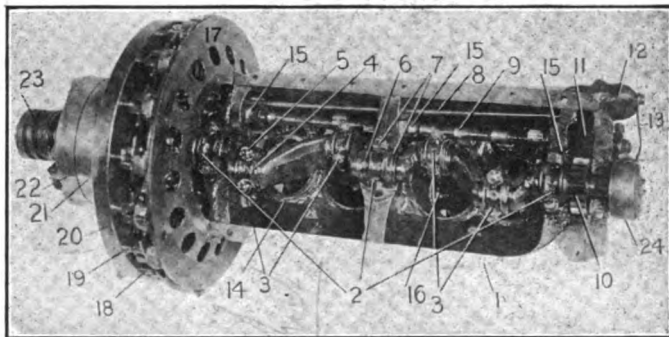
To get at the valves for grinding and reseating, first disconnect the gasoline line at the carburetor, after having turned off the gasoline at the tank; then unfasten the exhaust pipe by unscrewing the large packing nut. The manifolds are both held by stirrups extending from four studs at the top of the cylinder block. The nuts should be loosened or removed and the stirrups can then be twisted or taken off, permitting the removal of the manifolds. After the throttle lever has been unfastened from the carburetor, the intake manifold, with carburetor attached, can be removed. The covers, which are beneath the intake manifold and back of the carburetor, may be removed by taking off the nuts at the centres of the covers, thus exposing the valve tappets and springs. Various spring lifters and valve spring devices for compressing the valve springs to facilitate the removal of the valves can be bought. A bar flattened at one end and slotted to the shape of the letter Y is an effectual tool. An S-shaped piece of wire fastens this bar to either of the manifold stirrup studs, or a block of wood against the frame can be used to obtain the leverage to compress the spring against the cylinder block. When this is done the key through the lower end of the valve stem can be removed and the valve slipped up through the top of the cylinder. Before removing the valves from the engine, they should be marked or stamped with a punch so that they can be replaced as before. Beginning with the first valve, or the one nearest the radiator, the first, fourth, fifth and eighth are exhaust valves; the second, third, sixth and seventh are intake valves. For regrinding but one special tool is necessary. It is for turning the valve

and resembles a short letter Y, the two points fitting into the two holes in the head of the valve. (For grinding and reseating valves, see "General Power Plant Overhaul.")

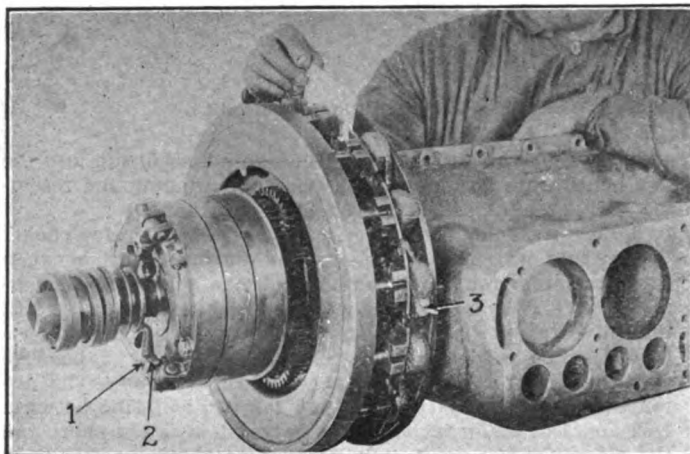
Before replacing the valves and springs, each valve should be put into its respective place and the clearance between the valve stem and tappet noted, each one being noted separately as follows: Turn the engine crank over slowly until the valve tappet has risen to the top of its stroke, and returned; then turn the crank one-quarter so as to be sure that the tappet is resting on the heel of the cam. The distance between the valve stem and tappet should be between $1/32$ and $1/64$ of an inch. If the valve stem is too short and the clearance too great, it is possible to obtain special Ford valve adjusters for the purpose. If the valve clearance is too small the valve stem may be filed until the clearance is correct. After the valves have been ground and adjusted the springs and collars may be put into place, the springs compressed and the key passed through the valve stem. If the power plant is to be removed later the manifolds and valve covers should be left off, otherwise they should be returned. The cylinder head should be left off at this interim.

The oil should now be drained from the base of the engine, through the lower drain cock on the back of the flywheel housing, at the right side, near the bottom. Engines made prior to 1912 have no crank case covers, and these engines must be removed from the chassis before the crankshaft and connecting rods can be repaired. With the crank case removed the connecting rods should be examined. To remove the connecting rod from the engine, first take off the connecting rod cap and then push the piston up through the top of the cylinder block. In any case where the caps are removed be extremely careful not to allow the piston to drop down so as to allow the lower ring to slip from the cylinders, inside the crank case. If this happens it will be an extremely difficult job to get the piston from the cylinder without breaking the piston ring. The cost of a new connecting rod with new babbit is slight if the old one is returned in exchange. While the pistons are out of the cylinders, examine the piston rings.

The crankshaft should next be examined. Place a jack under the car, blocked to such a height that it is possible to apply the lift against the crankshaft at either of the connecting rod journals, while it is in its topmost position. By working the jack up and down and watching the bearings one at a time, judgment will tell whether the crankshaft is loose in its bearings. If there is any play the cap should be tightened until it is taken up. If the caps cannot be made tight enough it will be necessary to remove the engine from the



Cylinder Block Assembly as Seen from Underneath: 1, Cylinder Block Flange; 2, Main Bearings; 3, Connecting Rod Bearings; 4, Connecting Rod Caps; 5, Cap Bolts; 6, Main Bearing Caps; 7, Cap Bolts; 8, Oil Tube; 9, Camshaft; 10, Crankshaft Timing Gear; 11, Camshaft Timing Gear; 12, Breather and Filler; 13, Timer Case Clamp; 14, Piston; 15, Camshaft Bearings; 16, Wristpin; 17, Magneto Field; 18, Magneto Field Coils; 19, Magneto Magnets; 20, Flywheel; 21, Slow Speed Drum; 22, Brake Drum; 23, Clutch Spring; 24, Fan Belt Pulley.



Proving the Clearance of the Magneto Magnets and the Field Coils with an Ordinary Business Card: 1, High Speed Adjusting Screw; 2, Adjusting Screw Retaining Pin.

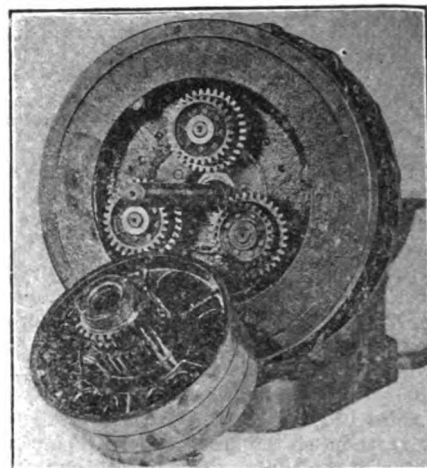
chassis and have the bearings replaced by a service station or expert repair man. (For methods of overhauling and adjusting connecting rod and crankshaft bearings and the service of piston rings, see "General Power Plant Overhaul.")

For further repairs to the engine removal of the engine block from the chassis will be necessary. With two exceptions repairs on the transmission gearset cannot be made without removing the same with the engine block from the chassis. It is possible now to adjust the low, reverse and brake bands, as well as the high-speed clutch. The slow speed band may be tightened by loosening the lock nut on the right side of the transmission cover and turning the adjusting screw (3) to the right (see illustration). To tighten the brake and reverse bands remove the transmission case cover door and turn the adjusting nuts (1 and 2) on the shafts to the right (see illustration). See that the bands do not drag on the drums when disengaged, as they exert a brake effect that tends to overheat the motor. The bands, when worn to such an extent that they will not take hold properly, should be relined, so that they will engage smoothly without causing a jerky movement of the car.

If it has been decided to remove the engine from the chassis, it may be done either after the above repairs have

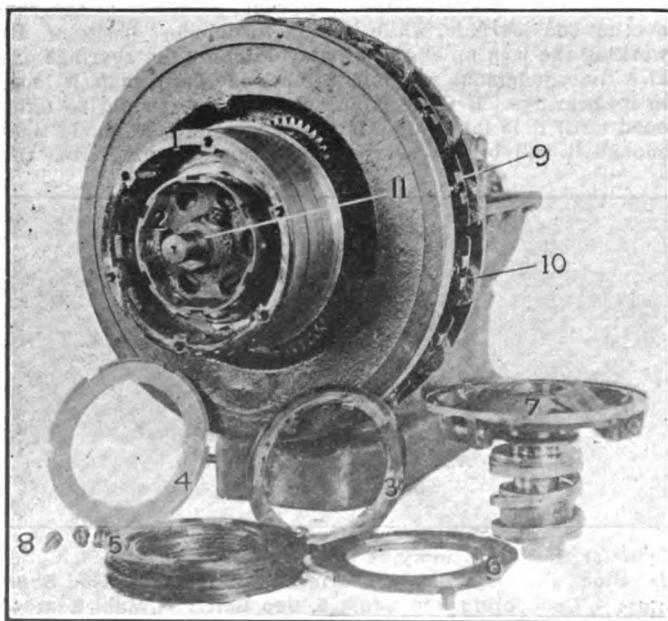
been made or at the beginning of the overhaul.

The engine and transmission gearset are in one unit and called the power plant. The power plant base forms the lower part of the crank case, the fly wheel housing and oil reservoir and the lower part of the transmission gearset case. This base

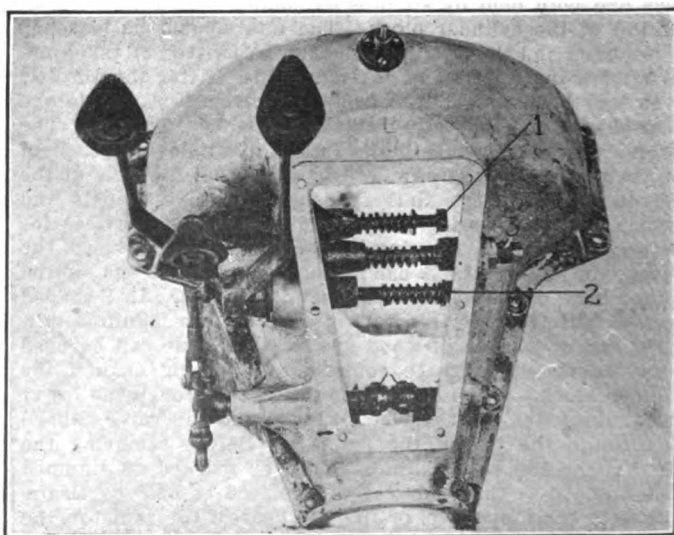


Transmission Drum Assembly Removed from Flywheel Shaft.

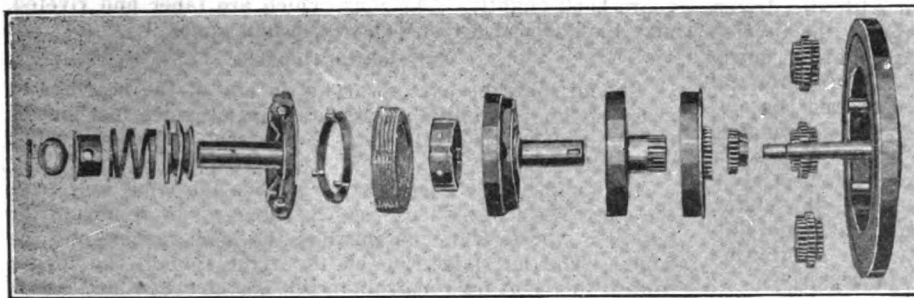
should be examined, particularly at the three points of suspension where the lugs or hangers are riveted to it. Should the case hangers be loose, or the rivets of the front end bearing be worn, the power plant should be removed and when the base has finally been taken from the engine the loose parts should be both riveted and welded to it, as welding makes a permanent repair. In this case the removal is as follows: To remove the power plant and base from the car it will be necessary to remove the radiator and wash board and disconnect the drive shaft unit from the gearset. The dash board is bolted to the chassis at three places. Remove the bolts that fasten the dash board braces to the frame. Then disconnect the spark and throttle control rods at the steering column. Next remove the drag link that is fastened to the steering ball arm and remove the bolts that hold the steering post bracket to the frame. After the secondary and primary wires are disconnected from the dash the dash may be removed. Before removing the wires from the dash a tag with an identifying number should be attached to each loose end, so that there will be no mistake made in replacing it. Now turn off the gasoline and disconnect the gasoline pipe at the carburetor. Disconnect the exhaust pipe from the manifold, then disconnect the rear drive member from the transmission gearset. This is done by removing the four bolts that hold the universal joint housing to the transmission gearset case. Then take out the bolts that hold the front radius rods in the socket underneath the crank case and remove the pans on either side of the cylinder casting. The engine is now supported and fastened to the frame at three points, in the front where the starting crank is located and at each side of the magneto. Pass a rope through



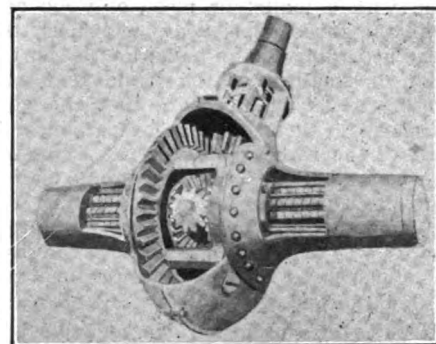
Transmission with High Speed Clutch Partially Disassembled: 1, Brake Drum; 2, Disc Drum; 3, Master Disc or Distance Plate; 4, Internal Driven Clutch Plate; 5, Clutch Push Ring; 6, Driving Plate and Assembly; 7, Driving Plate Screws; 8, Magneto Magnets; 9, Magneto Field Coils; 10, Disc Drum Set Screw.



Cover of Transmission Case and the Control Mechanism: 1, Reverse Adjusting Nut; 2, Brake Adjusting Nut; 3, Slow Speed Adjusting Nut.



The Flywheel and Transmission Gearset Components, Showing Them Disassembled, but in Their Relative Positions.



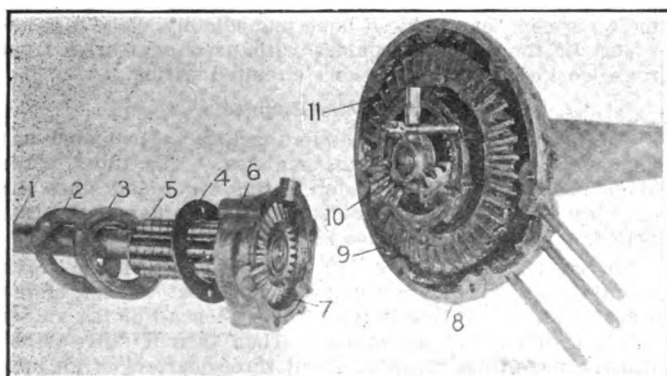
Cut Away View of Differential and Center of Rear Axle.

the opening between the two middle cylinders and tie it to a hoist, which should be supported at the roof of the garage; then remove the bolts at the three points of suspension and the power plant may be lifted from the frame. Now drain the oil from the crank case and the same order of repairs already directed for the engine in the chassis can be made.

With the power plant out of the chassis and the cylinder head removed, much of the work can be done with the engine "on its head." First remove the bolts that hold the crank case to the engine block, then remove the bolts holding the transmission gearset, cover and crank case together. The cases may then be lifted apart, leaving the engine, magneto, gearset and clutch band assembly together.

Where no repairs are to be made on the engine and transmission case, the power plant may be removed without disturbing the base in the following manner: After the radiator has been removed and other connections taken off, with the exception of the dashboard, as directed before, instead of removing the bolts at the three points of suspension, remove the bolts which fasten the engine block to the base and the bolts which fasten the gearset cover to the same base. After the gearset cover has been removed the power plant may be removed in the same way as before directed, except in this case the engine and transmission base is left in the chassis.

The flywheel and transmission gearset assembly may now be removed by cutting the wire which passes through the heads of the cap screws in the flywheel flange at the rear end of the crankshaft, and removing the screws. Slight difficulty might be encountered at this point because of the fact that in addition to the four cap screws the flywheel is fitted with two dowel pins, closely fitting in holes in the crankshaft flange. A few blows of the hammer against a piece of wood held against the flywheel will drive off the flywheel, leaving the engine and transmission gearset in two units, which are more easily managed than when assembled. After the removal of the connecting rods and crankshaft bearing caps, the crankshaft may be lifted from the engine block, the main bearings examined, and, should replacement be necessary, the block with the crankshaft returned to the factory or service station.



Left Half of Rear Axle, Showing Differential Partially Disassembled: 1, Driving Shaft; 2, Outer Thrust Ring; 3, Middle Thrust Ring; 4, Inner Thrust Ring; 5, Inner Shaft Bearing; 6, Differential Gear Case; 7, Differential Gear; 8, Axle Housing; 9, Differential Spider; 10, Differential Pinion; 11, Master Gear.

As a general rule the camshaft and bearings show but little wear, even after years of service. If, however, there is any play in the bearings, the camshaft may be removed as follows: Remove the plate that is fitted to the front end of the engine block, which will expose the camshaft timing gear. If the gear shows signs of wear it may be removed by taking off the long camshaft gear lock nut. The gear may then be pulled from the shaft, as it is held from turning by two dowel pins. After the two screws on the right side of the engine block, which lock in the bearings, have been taken out, the camshaft can be driven out of the engine block by placing a piece of hard wood or iron bar against the side on one of the cams and pounding it toward the front. Before reassembling the engine, thoroughly clean and oil every part. Pay particular attention to the oil tube that carries the lubricant from the flywheel housing to the front of the crank case. Blow it out or run a wire through it.

Planetary Transmission Gearset.

The transmission gearset is a planetary type. The speeds are obtained in two ways—the low speed forward when the middle drum is held from turning by the band which surrounds it; the reverse, when the first or front drum is held. The last or back drum with the band constitutes the service brake. The high speed clutch is located at the back and the exterior parts are the collar, spring and clutch fingers, all bolted to the outer part of the brake drum. This assembly may be removed without disturbing the arrangement by cutting the wire that passes through the heads of the cap screws which hold it to the brake drum and removing the screws. The condition of the high speed clutch plates should be carefully noted. Many drivers have a habit of "slipping the clutch," which results in wear upon the clutch plates. Should the web of the brake drum show much wear where the master clutch plate engages it, the drum should be replaced.

Removal of Clutch Parts.

The clutch disc drum on which are mounted 13 of the clutch plates must now be removed. This is held to the shaft by a lock nut that must be loosened and is kept from turning by a key. The clutch drum can be drawn from the shaft with a wheel puller or a special puller designed for the purpose, which may be obtained at any repair shop or supply house. After the clutch drum has been removed the three drums may be slipped from the shaft, pulling with them the three triple gears that are mounted on studs on the flywheel. Unless there is excessive play the gears are worn, or the drums badly scored, it is unnecessary to disassemble the drum assembly, which is held together simply by the outside or driving gear being forced on the brake drum shaft with a key to hold it from turning. With the removal of this gear the drums can be drawn off. The parts of the gearset and their correct relationship are clearly shown in the picture.

Reassembling Transmission Gearset.

The reassembling of the transmission gearset is not a difficult matter if these directions are followed: First, place the brake drum on a box or table with the hub uppermost; upon it place the slow speed drum with gear uppermost, then the reverse drum with gear uppermost. After the two keys are put into place the driven gear may be forced into posi-

tion with a mallet or piece of wood and a hammer. Next take the three triple gears and mesh them with the driven gear according to the punch marks on the teeth, the reverse gear or smallest of the triple gear assembly being downward. After making sure that the gears are all properly meshed, tie them in place by passing a cord around the outside of the three gears. If the flywheel is now placed face downward on the table the group may be inverted and put into position, each triple gear fitting on to a flywheel stud. The clutch drum may then be put into position, the clutch plates, with a large plate on both the extreme inside and outside, placed in the brake drum, one at a time, alternating with large and small discs until all are in place.

After the clutch and gearset have been reassembled, and the flywheel bolted to the crankshaft, the distance between the face of the magneto coils and permanent magnets should be carefully tested and adjusted. This distance should be equal to the thickness of an ordinary business card. Each coil, together with all the magnets, should be tested in order. Before replacing the transmission gearset case the condition of the clutch bands should be noted, and should the fabric facing show wear it should be replaced.

Rear System Repairs.

The frame should next be supported upon jacks, horses or boxes, high enough to remove all weight from the rear axle. Next unfasten the brake rods and spring connections at the ends of the axle. The rear system may then be drawn from the car.

The radius rods, or rods which extend from the ends of the axle housing to the universal joint housing, should be removed, and the bolts which hold the drive shaft housing to the rear axle housing taken out. The drive shaft may then be taken from the axle. The universal joint is removed from the shaft by driving the pin holding it to the shaft out of its seat. This can be done through a large hole in the ball housing surrounding the joint. Since all of the drive of the car and all of the road strains are carried through this joint, it is subject to a great deal of wear. The replacement of this part is necessary if much wear or play is evident.

The pinion at the rear end of the drive shaft is held by key and a nut, which is locked by a cotter pin. Upon removal of the pin, nut and key, the pinion may be drawn from the shaft. Unless it be found necessary to replace either the pinion or the shaft, the pinion need not be taken off, since the gear and shaft may be slipped from the torque tube, permitting inspection or replacement of the roller bearing and race. In every case where the exterior race or sleeve surrounding the roller bearing is removed, it should be replaced with a new one. This is essential because it is impossible to remove the sleeve without springing it out of line.

Rear Axle Disassembling.

To facilitate operation the rear axle should now be placed across two horses or boxes, wheel hub caps and the nuts and keys which hold the wheels to the shafts taken off, and the wheels removed. This will give access to the brake bands and brake cams. Upon removal of the steel and felt washers the roller bearings may be removed and examined. Remove the seven bolts holding the central section of the rear axle housing together and the halves of the housing may be drawn off, leaving the differential gearset with the two axles on the horses or boxes. Make note that the drive or master gear is at the left side of the housing, facing the front of the car.

Until 1916 the axle housing was made with belled tubes riveted to the pressed steel central section. These rivets frequently loosened or sheared, weakening the housing. If this type axle is being overhauled, have the joint welded, which will completely restore it and insure against oil leakage.

The differential is disassembled by cutting the wire and removing the three nuts and bolts which hold the case halves together. This will expose to view the three differential pinions, as well as the two differential gears.

Carefully examine the master gear bolts or rivets, as the case may be, and be sure that the gear is firm to the differential case.

The differential gears on the ends of the axle shafts are held either by a pin through the hub or by a split ring at

the centre. The split rings may be removed by driving the gears back slightly. The pins, which are taper and riveted, may be filed and driven out with a nail punch.

Differential Repairs.

Should there be excessive play in any of the bearings or gears of the differential, repair is essential, since lost motion in this unit brings strain upon the gearset and engine when the car is started.

It should not be necessary to remove the front axle from the car. The front wheels may be taken off by removing the hub caps, the nuts on the spindles, the lock washers and the cones. The nut and cone on the right spindle are turned toward the right for removal since it is a so-called "left hand" nut. Those on the left side are right hand.

Disassembling Steering Gear.

In disassembling the steering gear the cap on top of the steering column and beneath the wheel is first unscrewed. The wheel and cap may then be pulled out, exposing the three planet gears mounted on the spider on the end of the steering post. After the ball arm is removed the steering post can be drawn up through the steering column. Every part of the steering column should be carefully examined, the condition of the internal and planet gears noted and replacements made where there is evidence of wear. A vital part of the steering mechanism is the wheel spindle assembly. After a car has been in service there is sure to be wear at these points. The spindle bolts usually should be replaced and the spindle bodies rebushed.

Should the bushings not fit they may be reamed with a straight reamer to the correct size. Such a tool is made by the G. H. Dyer Company of Cambridge, Mass.

Brake and Clutch Adjustment.

After the power plant the rear axle and the wheels are assembled, the brakes and clutches may be adjusted. The high speed clutch is adjusted by countersunk set screws, one in each clutch finger, and are kept from turning by a pin passing across the slot in the screw head. The high speed clutch should be adjusted so that it does not drag when the pedal is at its central position or when the emergency lever is pulled back, thereby holding the pedal at the centre.

The low speed, reverse and service brake bands are adjusted by turning the adjusting nuts on the cross members of each pedal, outside and inside the housing. It is essential that none of these bands drag when the pedals are in the "off" position.

Be sure that the slow speed band does not bind on account of being adjusted too tight. Don't use a too heavy grade of oil in cold weather, as it will have a tendency to congeal between the clutch discs and prevent proper action of the clutch. If the lining on the clutch bands and service brake are badly worn they should be replaced with new linings.

The electrical installation should be completely removed from the car if it has been in use for any considerable length of time, the coils tested and the wires replaced by new. The timer should be carefully examined and a new roller or body put into place if there is evidence of wear. This will eliminate 50 per cent. of trouble if done immediately, since a greater part of the owner's troubles with used cars arise from grease soaked or oily and short circuited wiring.

Timing the Engine.

The firing order of the cylinders is 1, 2, 4, 3; number one cylinder being the nearest the radiator. The timer wires should be attached to the timer in this order and since the timer brush revolves counter clockwise the order of the connections when read clockwise is 1, 3, 4, 2.

To check up the timing it is necessary to turn the crank until the piston in number one cylinder is at the top of the explosion stroke. (This is the stroke when all of the valves in this cylinder will be closed.) Then turn it still farther until the piston has traveled about three-quarters of an inch downward. The timer rod is set at full retard and the position of the timer brush noted.

The timer roll will be over one of the contacts, and it is to this contact that number one wire should be connected; the other wires are then to be connected as before directed.

THE HUDSON SUPER SIX

(For Practices of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

SINCE its initial appearance the mechanical construction of the Hudson Super-Six has been changed but little. In many cases, particularly in the transmission and rear axle, it is similar to the six of previous models.

The engine is of the L head type and is fitted with removable head. Circulation in the radiating system is maintained by a centrifugal water pump, while that of the oiling system is kept up by the action of a plunger pump. Both the gearset and clutch are in unit with the engine, the latter being mounted in the flywheel and removable only when the transmission has been taken from the engine. Practically all of the engine overhaul work may be done on that unit without removing it from the frame, the only exception being the replacement of the upper halves of the main bearings and repairs to the crankshaft.

Beginning of Overhaul Work.

If the overhaul is to be general the radiator should first be drained and then removed from the chassis. This unit is bolted to the chassis by a bolt on each side, retained by a brace rod at the top and connected with the engine through two flexible hose connections.

With the radiator free from the car the water manifold should be removed. The two storage battery wires should next be disconnected from the battery and after the primary wire leading to the distributor unit has been unfastened and the distributor head removed, as well as the spark plug wires disconnected, the clips fastening the ignition cable tube to the engine should be disconnected. The ignition wiring can then be lifted from the engine and tied back against the dash.

The hot air pipe leading from the hot air stove on the exhaust manifold to the carburetor should next be unclamped from the carburetor and removed, leaving the top of the engine clear for further work.

When the cap screws fastening the cylinder head to the block have been taken out the head may be lifted from the engine, exposing the pistons, cylinders, valves and firing chambers. Carbon, after having been softened by the use of kerosene oil, may be removed very easily with a dull chisel or screw driver. A stiff wire brush makes an ideal tool for scraping the carbon from the valve chambers.

The pressed steel oil reservoir, which is bolted to the lower part of the crank case, should next be removed, after draining the oil from the system. When the base has been taken from the engine the lower part of the engine is exposed.

All of the bearing caps, both for the main bearings and the connecting rods, are fastened in place by two steel bolts on each bearing. When the caps have been removed from the connecting rod bearings the pistons may be removed through the top of the engine. Like the valves the pistons and connecting rods should be replaced in their respective places and should be marked with the number of the cylinder before removal. In replacing connecting rods be sure that the dipper opening on the cap faces toward the left side of the engine.

Disassembling Oil Pump and Timing Gears.

The oil is supplied by a plunger pump and is termed combination force feed and splash.

The oil pump, as well as the Delco distributor unit, are driven by the same shaft from the water pump driving gear. To disassemble it, first remove the distributor and breaker box unit, which is fastened to the pump housing by four cap screws. With the screws removed the timer unit may be lifted off and the two pump housing cap screws taken out, permitting the removal of the pump unit from the crank case.

The next step in the overhaul is the removal of the timing gear case. Before this can be done the large right hand threaded nut which fastens the fan belt pulley to the crankshaft must be taken off. The fan belt pulley may then be pulled from the shaft, the timing case cover screws removed and the cover taken off, exposing the timing and pump gears.

Next remove the nut on the end of the pump shaft and pull off the pump gear. Then disconnect the pump from the

generator shaft by removing the coupling bolts, and remove the pump housing retaining screws. The pump may then be taken from the crank case. With the pump will be taken the pump shaft front bearing, which is mounted in the front of the timing gear case together with the timing unit drive gear.

Disassembly of Water Pump Unit.

Complete disassembly of the pump unit is accomplished as follows: Remove the taper pin and pull of the pump shaft coupling, then unbolt and separate the two parts of the pump housing. The pump impellor is retained by a taper pin and key and must next be taken from the shaft, permitting the removal of the front pump housing and the front bearing housing. The taper pin may then be driven from the timer gear and that gear pulled from the shaft, completing the disassembly. With the complete unit installed on the engine there should be not over 1/64 end play in the pump shaft. Excessive play is removed by inserting shims between the timer gear and the front pump bearing in the timer gear case. The latter bearing may be removed from the front of the engine after the four retaining cap screws have been taken out. In replacing the pump impellor blade be sure to have the blades replaced in the proper direction of rotation or the pump will remain inoperative.

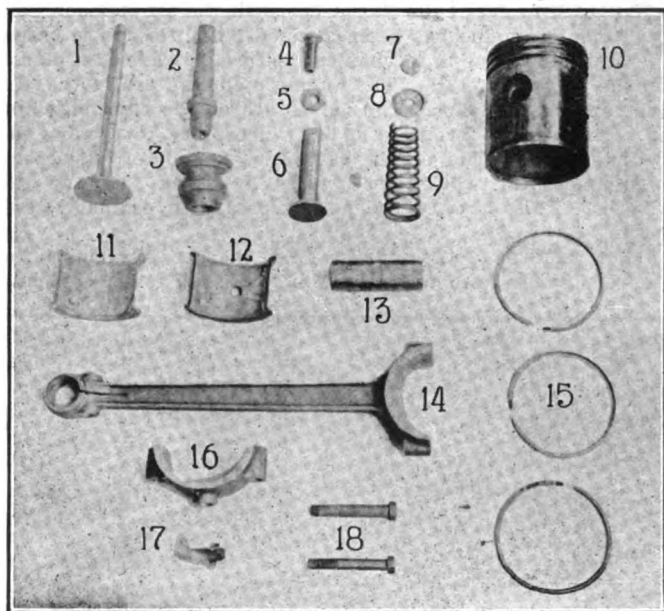
With the front of the timing gear case removed the camshaft may be pulled from the engine. Before taking out the camshaft, however, the push rods should be wired or tied at their topmost point so that they will not interfere with the cams as the shaft is drawn forth.

Disassembly of Power Unit.

The engine is suspended at four points and bolted to the frame by two bolts at the rear and one in the front on each side. This unit should not be removed from the chassis until the transmission has been taken from it.

After the camshaft has been taken out the push rods may be removed from the inside of the engine and the push rod guides driven out from the inside, providing inspection shows the necessity of replacement of these parts.

If the cylinders are to be removed from the engine the exhaust manifold should first be disconnected at the coupling, then the retaining cap screws taken out and the manifold



Piston and Valve Parts: 1, Valve; 2, Valve Steam Bushing; 3, Push Rod Bushing; 4, Adjusting Stud; 5, Lock Nut; 6, Push Rod; 7, Valve Retaining Washer; 8, Valve Spring Washer; 9, Valve Spring; 10, Piston; 11, 12, Connecting Rod Bearings; 13, Wrist Pin; 14, Connecting Rod; 15, Piston Rings; 16, Connecting Rod Cap; 17, Dipper; 18, Retaining Bolts.

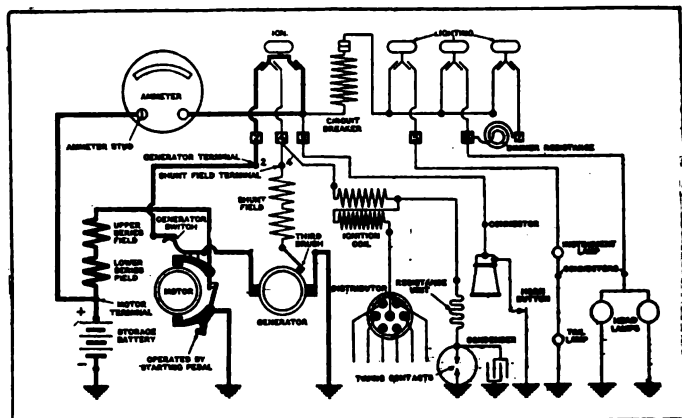
removed. The carburetor should next be taken off and the cylinder block cap screws removed, permitting the lifting off of the entire block.

The clutch unit is contained in the flywheel and when the clutch pedal is depressed the spring tension is taken by the pedal arm or fork. Press down on the pedal and remove the 12 cap screws which fasten the clutch cover to the flywheel. Upon the release of the pedal the cover will be forced off and the clutch discs out until the clutch spring expands to the length of the clutch spring bolt, when it will cease to exert pressure on the discs. The pedal may then be unbolted and the entire clutch assembly slipped from the flywheel. Under no conditions should the nut be taken from the clutch spring bolt, unless the spring is compressed beneath an arbor press, since the spring exerts a pressure of many hundred pounds.

The steering gear is of the worm and wheel type, both the worm and wheel being accessible by the removal of caps over these parts. An allowance of not over 1/64 of an inch end play is made in both the worm and wheel shaft. Excess play in the steering column is taken up by the removal of shims between the housing and the cover. Play in the wheel is taken up by the nut and stud adjustment in the worm wheel cover. Where the play between the worm and wheel is excessive the eccentric bushing may be turned to compensate. This adjustment is located back of the steering arm and is kept from turning by a lock screw.

Timing and Adjustments.

The valve timing of the Hudson car should be adjusted before the timing gear has been placed on the crankshaft. Turn the crankshaft over until the piston in number one cylinder has traveled down from the top of its stroke 1/64 of an inch. Then turn the camshaft in its proper direction of rotation (toward the left) until the intake valve of number one cylinder has just started to open. The gears should be meshed at this point. The timing may be checked by the following data: Inlet closes 17/32 after bottom dead center; exhaust opens 57/64 of an inch before bottom dead center and closes 1/32 of an inch after top dead center.



Delco Wiring Diagram. System Used on Hudson Super-Six.

With the spark lever advanced the spark should take place in the cylinders $\frac{5}{8}$ of an inch before the top of the piston stroke is reached. To set the ignition unit put it into place on the engine, and turn the crankshaft until the piston in number one cylinder is $\frac{5}{8}$ of an inch before the top of the firing stroke. Both valves should then be closed.

Next remove the distributor head, take off the distributor arm or brush and loosen the screw in the center of the cam. The cam may be pulled or pried upward until it rotates freely upon the shaft. Set the spark lever at advance position and replace the distributor brush. Turn the cam and brush until the brush comes beneath the distributor segment connected with number one cylinder, then remove the brush again and turn the cam forward until the breaker points are just beginning to separate. Then tighten the screw and replace the brush and head.

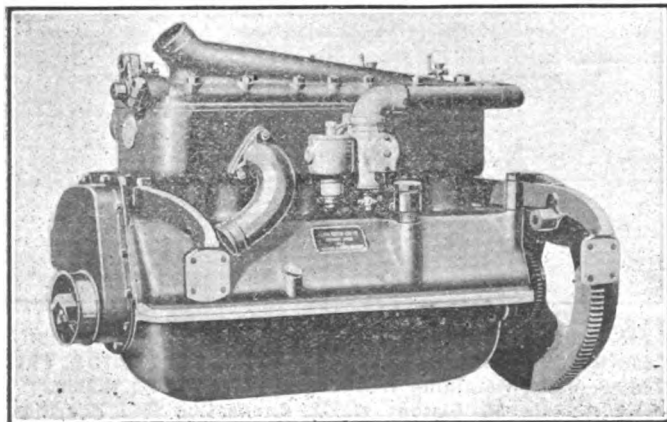
Aside from cleaning the carburetor requires no special attention or adjusting. In assembling this unit be sure that the arrow on the bell points in the same direction as the open end of the V groove, and that the arrow also points in the same direction as the arrow on the throttle body.

THE SAXON SIX

(For Practices of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

IN CHASSIS detail the Saxon car with the six-cylinder Continental engine has been changed but little and is essentially the same in mechanical feature as when first placed on the market in 1915. The engine cylinders are of the "I" type and cast en bloc. The valves are on the right side and to remove them for grinding it is necessary to remove the cylinder head. The engine cannot be completely disassembled unless the whole power plant is swung clear of the chassis. This, however, is not necessary in ordinary overhaul.

For removal of the radiator from the car, disconnect the tie rod, water hose and retaining bolts. The horn should



Left Side of Saxon Motor.

next be removed, together with connecting wires. Disconnect all the secondary wires from the spark plugs and mark them with tags so that they may easily be replaced. Slip off the timer head and disconnect wires leading from the timer to the coil and remove this assembly from the car. Remove the castellated nut that holds the fan to the cylinder block and remove fan assembly from the engine.

Next remove the 20 bolts that connect the cylinder head to the block and lift the head up. Care should be taken not to injure the gasket when removing the cylinder head. The plugs which fasten the cylinder head to the block may be removed by a wrench, care being taken to note the length of the plug, the longest being at the front of the engine. When these are replaced they should be coated with white lead to prevent water leakage into the cylinders.

Remove the cover plates on the right side of the engine. Hold the valve down from above, lifting the "spring washer" with a valve lifting tool and remove the retainer and washer, after which the valve can be lifted out.

Clean the valve, noting that the valve stem, as well as the head is free from dirt or gummed oil. Replace the valve in its seat and grind the seat by rotating the valve head with a screw driver or valve grinding tool, using grinding paste between the valve and its seat. Care should be taken in keeping the grinding compound from working its way into the valve ports and cylinders.

After reassembling the engine turn the flywheel until the exhaust valve No. 1 cylinder just closes and when this point is reached the valve tappet will readily turn under the fingers. At this point the mark "Ex. Cl." (exhaust closes) on the flywheel should be directly above crankshaft center. If

the closing is not correct, rotate the flywheel to bring this mark directly above the crankshaft center and adjust the valve tappet so that it will just free itself at this point. The adjustment is made by loosening the lock nut and screwing the adjusting screw up and down. Turn the flywheel a short distance in the same direction, bringing the mark "In. Op." (inlet opens) above crankshaft center. With the flywheel mark in this position the inlet valve on No. 1 cylinder should start to open. If it does not, adjust the inlet valve tappet as described above. Repeat the operation for each cylinder.

Turn off the gasoline at the tank and drain the fuel from the pipes at the carburetor. Disconnect the fuel line at the carburetor and also remove all the carburetor control rods. The intake and exhaust manifolds are clamped to the engine with four yokes and these being removed the intake, exhaust and carburetor can be removed. When adjusting the Ray-field carburetor, bear in mind that both adjustments are turned to the right for a richer mixture, as it is indicated on the adjustment screw heads. Be sure that the manifold connections are absolutely tight and free from air leaks and that openings are without sediment likely to obstruct the passage of gasoline. Always adjust the carburetor with the dash control down and the low speed adjustment must be completed before the high speed is touched. In adjusting the low speed with the throttle closed, close the nozzle needle by turning the low speed adjustment to the right about three complete turns. Open throttle not more than one-quarter. Prime the carburetor by pulling steadily a few seconds upon the priming lever. Start the engine and allow it to run until warmed up. Then, with retarded spark, close the throttle until the engine runs smoothly without stopping. Now, when the engine is thoroughly warm make the final adjustments by turning low speed screw to the right a notch at a time until the engine idles smoothly. If the engine does not throttle low enough, turn stop arm screw to the left until it runs at the lowest number of revolutions desired.

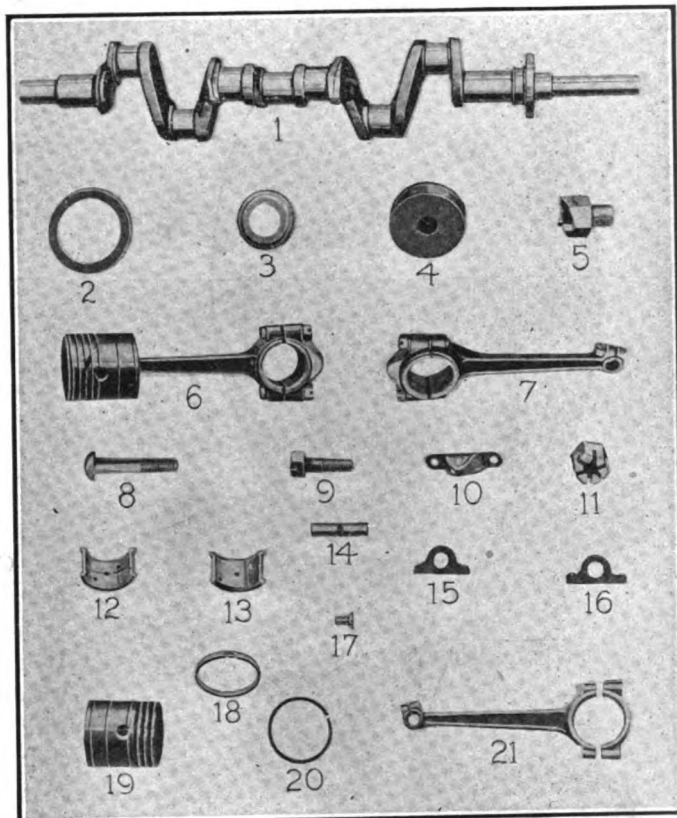
In adjusting the high speed advance the spark about one-quarter. Open the throttle rather quickly. Should the engine "sputter" or backfire it indicates a lean mixture. This can be corrected by turning the high speed screw to the right about one notch at a time until the throttle can be opened quickly without backfiring. The adjustments cannot change.

After the oil has been drained from the oil reservoir the reservoir should be unbolted from the lower part of the crank case and given a careful scrubbing in kerosene. When this has been removed the crankshaft, camshaft, connecting rods and oiling system will be exposed.

The motor-generator, which is driven by the engine through a silent chain and sprocket from the crankshaft near the flywheel, is hung upon a bracket hinged so that the lower end can swing in a short arc for the purpose of adjusting the tension on the drive chain. This adjustment is regulated through an adjustment screw held in place by a check nut. Releasing the check nut the adjusting screw is free to be screwed in so that the necessary play needed to remove the chain can be obtained. The generator is removed by unhooking the bracket.

When the motor-generator is replaced care should be taken that the driving chain is not too tight. Swing the generator into place, replace the chain and take up on the adjusting screw just enough to obtain the proper tension on the chain. Care should be taken not to let the chain get slack. Tighten all the bolts and start the engine. If there is a hum or buzz it is an indication that the chain is too tight and in this case the adjusting screw should be screwed in sufficient to slacken the tension, after which the check nut should be retightened. After the adjustment is finished lubricate the chain with graphite and oil mixture.

The clutch is of the dry plate type, Raybestos lined, and consists of four plain steel plates and three with double facings of Raybestos, making six Raybestos surfaces. The Raybestos discs are driven from studs on the flywheel, and the steel plates are driven from studs attached to the clutch hub. When the clutch is thrown out these plates are allowed to separate, the Raybestos faced plates revolve with the flywheel and the steel discs remain stationary. When the clutch is let in the clutch springs force both plates together and the whole combination rotates, driving the propeller



1, Engine Crankshaft; 2, Fan Pulley Belt Washer; 3, Crankshaft Thrust Washer; 4, Fan Pulley Assembly; 5, Engine Starting Crank Jaw; 6, Piston and Connecting Rod Assembly; 7, Connecting Rod Assembly; 8, Connecting Rod Bolt; 9, Connecting Rod Clamp Bolt; 10, Connecting Rod Bolt Nut; 11, Connecting Rod Lower Bushing; 12, Connecting Rod Upper Bushing; 13, Piston Pin; 14, Piston Liner; 15, Connecting Rod Liner; 16, Connecting Rod Bearing Retainer Screw; 17, Piston Rings; 18 and 20, Piston; 19, Piston; 21, Connecting Rod.

shaft. This clutch facing should be carefully examined for worn surfaces and all parts tightened and adjusted.

Although it is not necessary to remove the transmission and rear axle assembly from the car for inspection, it is more convenient to do so. When the nuts which fasten the transmission gearset to the rear axle have been removed the gear case may be drawn from the axle, bringing with it the pinion gear and propeller shaft assembly. There are two universal joints, one at the front and the other at the rear of the propeller shaft assembly. The rear joint is enclosed in a case which is fastened to the housing and to the propeller shaft.

Removing the nuts allows the case to be slipped back upon the shaft, exposing the rear joint, which may be slipped apart. It is essential that both universal joints be in good condition.

After the rear universal joint has been removed the four screws that hold the transmission cover in place should be removed. The front roller bearing is clamped into place by a bolt which passes through the flange. When the bolt is removed the race may be drawn from the case for examination. After the transmission gearset covers have been removed, both the main shaft with all gears and the counter shaft may be removed. The rear bearing race is held in place by a set screw and when the screw is removed the race may be driven from the case.

The rear axle is the three-quarter floating type, and it is unnecessary to disassemble the housing to examine the bearings and gears. Remove the differential cover plate and the nuts on the wheel flanges and when this is done the shafts may be removed from the axle.

After assembling the adjusting nut that is located on the outer edge of the right bearing so as to allow the master gear to clear the pinion about 1/32 of an inch, the adjusting nut on the left should be tightened until there is practically no play in the differential. The engine should then be start-

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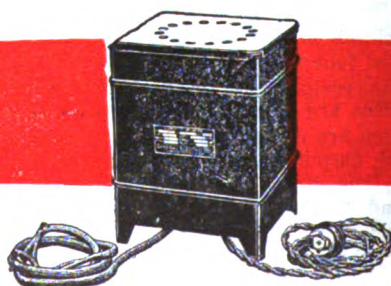
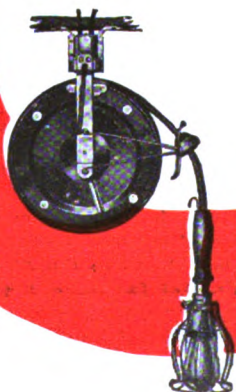
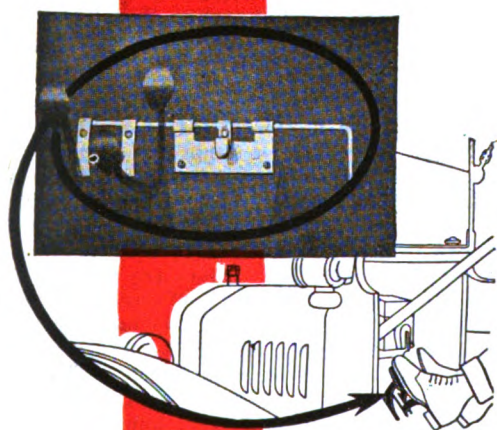
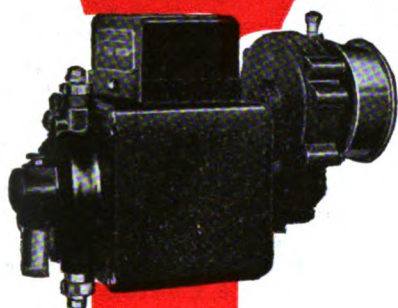
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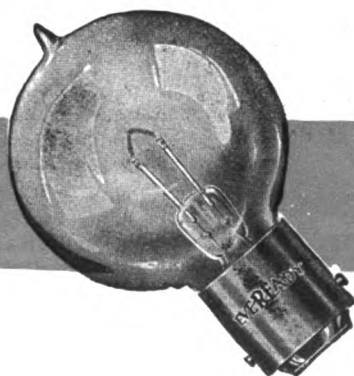
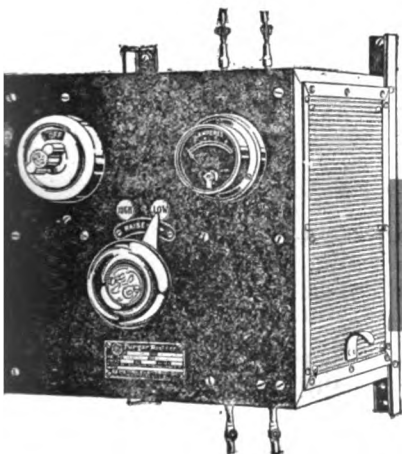
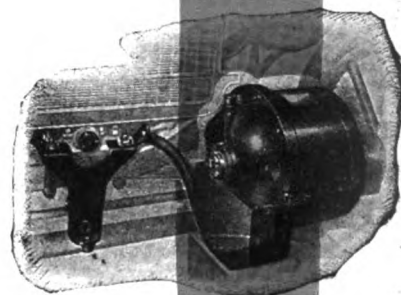


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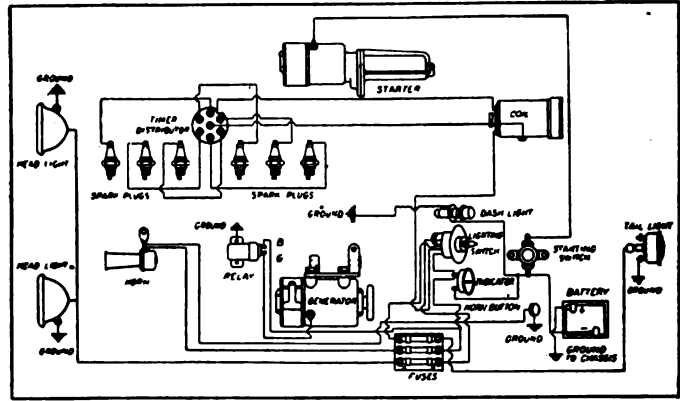
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ed and with both wheels clear of the ground the high speed dropped in. The differential should run with little or no noise and adjustment made with the adjusting nuts until the gears are adjusted to the proper depth.

The steering gear is of the worm and worm wheel type, it is irreversible, meaning that a shock or blow from a rut or stone cannot turn the wheel in the driver's hand. This will not require taking down, but observation throughout its length to see that it is properly lubricated is necessary. Fill the steering gear housing with heavy grease to lubricate the worm and worm gear and the upper and lower ball thrust bearings. Grease the cups over the steering arm shaft. If there is back lash or play in the steering column, take off the crank and put it on again at a point one-quarter the way around. This can be repeated two more times before the complete circle of the worm gear is brought into play. By that time the gear will have seen several years of service and will need new parts. If the steering wheel can be moved up and down it is certain that the ball thrust bearing must be taken up to prevent this end play. Loosen the bolt at the top of the housing which holds the adjusting nut and adjust by screwing the nut slightly into the case, continually moving the steering wheel to see that it is not tightened too much. This nut must be turned with a large wrench.

In the Saxon ignition the current is furnished through the Atwater Kent Unisarker. The timer requires very little attention and should not be tampered with unless something is wrong in the mechanism. The circuit breaker mechanism should be kept clean and with the contact points flat, parallel and accurately adjusted. If after much usage the platinum contacts become pitted and cause a bad contact, they can be filed flat with a fine file. Care should be taken to file off only enough to remedy the trouble. The screws are then reset



Saxon Wiring Diagram.

so that the gap is not wider than the thickness of a piece of tin or about 1/32 of an inch. In resetting the timer, crank the engine until No. 1 piston has passed its uppermost position on the compression stroke. This position can be readily located by the dead centre mark (D. C.) on the flywheel. No. 1 post on timer cap must now be in position to make contact with wiper. Rotate body of timer until contact breaker clicks. Then connect timer to spark control lever. The firing order is 1-5-3-6-2-4.

After the principle parts of the engine have been carefully inspected and all wear eliminated, either by adjustment or replacement of worn parts, and before the engine is reassembled, they should all be carefully cleaned. As each part is replaced it should be carefully and properly lubricated.

MAXWELL

(For Practises of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

BUT few changes in design have been made on the Maxwell car in the past few years, so that the general outline of repairs is the same for the later models.

The engine is of the L head type and forms a unit with the transmission gearset. It is supported in the frame at three points, the two members at the rear also serving to support the transmission gearset.

Before beginning the work of repair all the wiring should be disconnected from the engine, motor generator and magneto, and the terminals tagged so that they may be replaced. The radiator should then be drained and the hose connections removed.

The cooling fan is mounted upon an arm, which in turn is fastened to the cylinder head by a long bolt. This bolt must be removed and the 14 cap screws which fasten the head to the cylinder taken out. The head may then be lifted from

the block, giving access to the cylinders and explosion chambers.

With a putty knife, a stiff brush and kerosene the carbon may be removed from the cylinders, explosion chamber and valves. To facilitate the work the exhaust and intake manifolds, together with the carburetor, should be removed. After the exhaust has been disconnected and the throttle rod removed the two manifolds clamps may be removed and the manifolds taken from the engine.

The valve covers are held in place by two hand nuts. These are removed and the springs lifted with a Y iron or valve lifter, permitting the removal of the valve pins and valves. After the valves have been numbered and removed the valve pockets or chambers should be cleaned carefully.

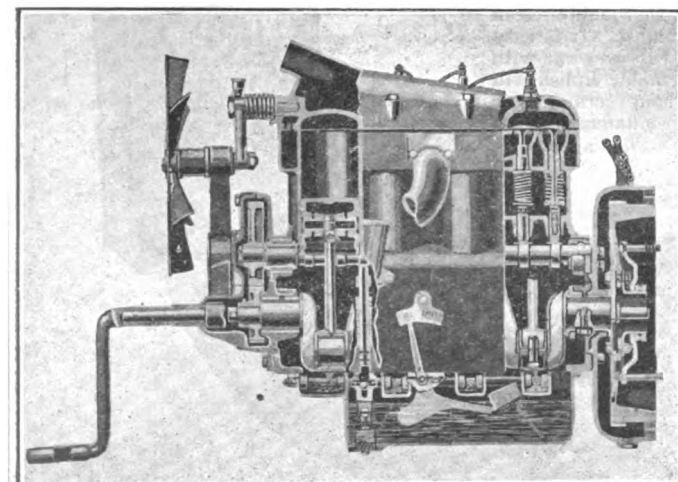
Cleaning Oil Reservoir.

The base of the engine forms the oil reservoir and the next step is to remove it from the engine by taking out the bolts and carefully lowering it from the car. The old oil should be removed and after it is strained through a cheese cloth used for general lubricating purposes, but not in the engine. The reason for this is that with the present day fuel the oil usually becomes mixed with a certain amount of precipitated kerosene and loses some of its lubricating properties, hence it is a good plan to replace the oil with new after about 2000 miles of running.

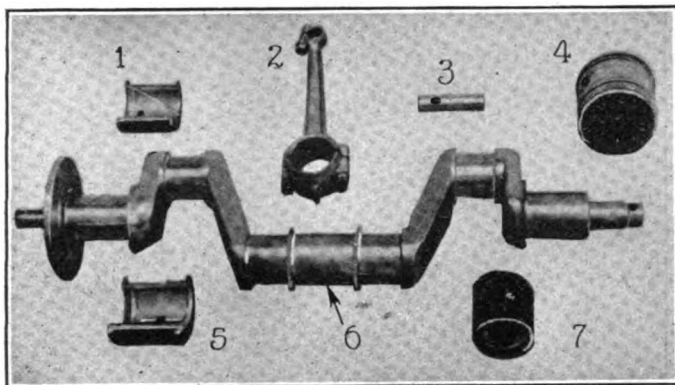
After the oil base has been removed the oil pans should be taken out, the oil pump retaining bolts removed and the pump taken out and cleaned. The oil case and oil pans should receive a thorough cleaning before they are put back into place. The oil pump exerts its suction tubes which lead to the oil troughs and these tubes should be cleaned with a flexible wire and flushed with kerosene.

The oil indicator is fitted with a float on the end of the arm and should the float be soaked with oil it should be placed in an oven until the oil has been baked out of it. After it has dried thoroughly it should be given three coats of orange shellac.

As a general rule in replacing the oil base a new gasket should be used. The gasket should be liberally coated with



Cut Away View of Engine, Showing Location of Parts and Oiling System.



Crankshaft and Piston Parts: 1, Upper Rear Main Bearing; 2, Connecting Rod; 3, Wrist Pin; 4, Piston; 5, Lower Rear Main Bearing; 6, Crankshaft; 7, Front Bearing.

shellac and clamped into place immediately. When gaskets are replaced all of the abutting surfaces should be cleaned carefully so that the fit will be perfect.

Points in Engine Removal.

Before removing the engine from the car the magneto and horn should be taken off. As the motor generator is secured to the flywheel housing by cap screws, three of which are inside the housing, that unit may be left until the engine is taken out.

Remove the four bolts which secure the universal joint ball housing to the transmission gearset. Next remove the four nuts and lift off the gear shift lever and control rods.

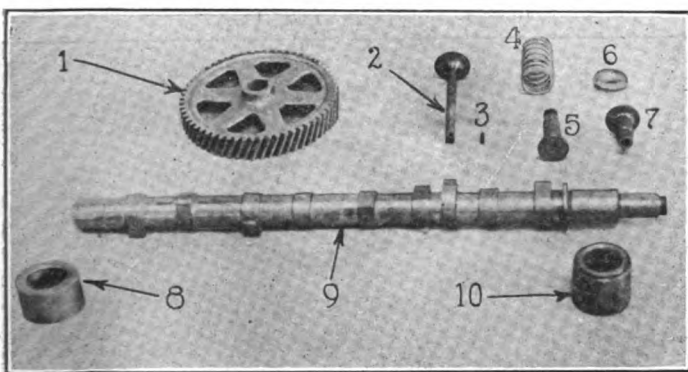
The engine and transmission gearset may be slipped forward and removed from the car, after the radiator has been removed. If the work is to be done by one person by the aid of a block and tackle, the tackle should be fastened back of the centre of the engine, as the weight of the transmission gearset will cause that end to drop unless the rope is near the center of gravity of the power plant.

Disassembling Power Plant.

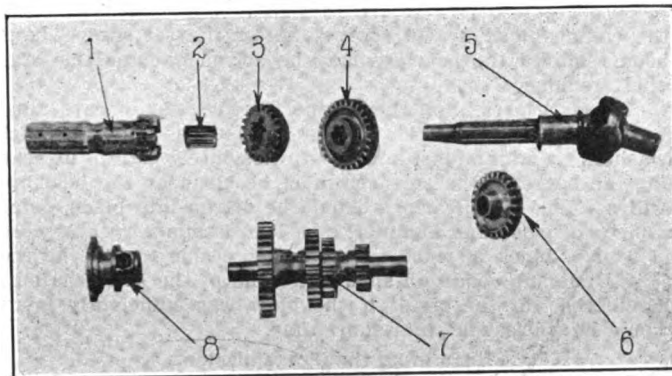
After the removal of the power plant from the car the first step in disassembling is to remove the transmission gearset hand hole plate and take off the three clutch spider nuts which hold the clutch springs against the clutch drum.

The cap screws which fasten the transmission bell housing to the supporting member are next removed, whereupon the gearset and housing may be removed from the engine, leaving the clutch spider on the supporting collar. The clutch spider with its ball bearing is retained by a spring ring which may be removed with a screw driver and a pair of pliers, and when this is done the bolts fastening the flywheel to the crankshaft are exposed.

The flywheel is fastened to the crankshaft by four bolts. When these are removed the flywheel may be pulled from the shaft. There should be absolutely no play between the bolts and the flywheel or crankshaft. It is essential that the fit be tight, or there will be a knock in the engine due to the running ahead or lagging of the flywheel at each explosion stroke. If the bolts fit poorly, or if the holes are ragged and



Camshaft and Valve Parts: 1, Timing Gear; 2, Valve; 3, Valve Pin; 4, Valve Spring; 5, Push Rod; 6, Valve Spring Retainer; 7, Valve Stem Guide; 8, 10, Camshaft Bearings; 9, Camshaft.

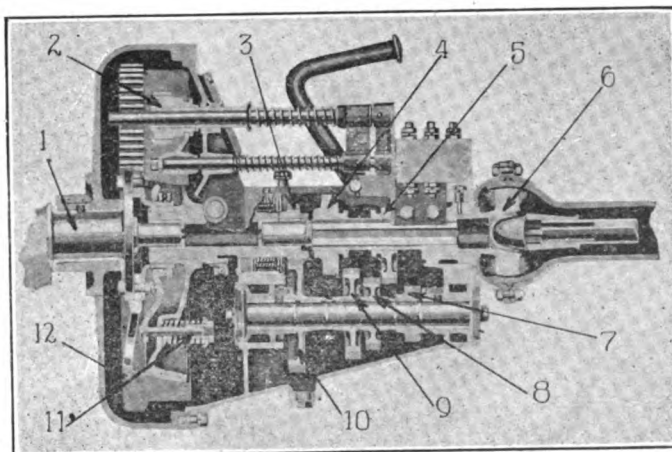


Gearset Components: 1, Pocket Gear; 2, Pocket Gear Pilot Bearing; 3, High and Intermediate Sliding Gear; 4, Low and Reverse Sliding Gear; 5, Transmission Main Shaft and Universal Joint Assembly; 6, Reverse Idler Gear; 7, Countershaft and Gears Assembled; 8, Front Countershaft Bearing.

out of round, the holes should be reamed out and new bolts fitted to the holes. With the flywheel removed the bolts holding the motor generator into place may be unscrewed and the coupling bolts taken out. The motor generator may then be taken from the engine.

The engine may then be placed "on its head" to facilitate the rest of the dismantling. The flywheel housing, which is fastened to the engine by six screws, should be removed next, exposing the crankshaft bearing. The generator pulley set screw should next be removed and the pulley drawn from the shaft, exposing the two bearing screws. When these screws are removed the generator drive shaft may be taken out. After the fan belt pulley, which is fastened to the magneto shaft by a set screw, has been removed the timing gear case screws should be taken out and the case removed. The timing gear on the crankshaft is fitted with a set screw and a key. After the set screw has been removed the gear should be drawn from the shaft. The timing gear on the camshaft is held in place by a nut and a key; this gear should also be removed.

The crankshaft is supported upon two bearings, one at the front, the other at the rear. The removal of the front bearing is accomplished by taking out the six timing gear case screws and removing the case; the bearing may then be driven from the case. It is not necessary to disturb the front bearing unless it shows wear, since the rear bearing and crankshaft may be removed through the rear of the engine. The rear bearing is fastened to the engine by the same screws that fasten the flywheel housing. Two bolts secure the bearing around the crankshaft and after these have been removed the bearing may be taken from the shaft. The camshaft is mounted on two bearings, which are held into



Sectional View of Transmission Gearset Showing Location of Parts: 1, Crankshaft; 2, Starting Pinion; 3, Pocket Gear; 4, High and Intermediate Sliding Gear; 5, Low and Reverse Sliding Gear; 6, Universal Joint; 7, 8, 9, 10, Reverse, Low, Intermediate and Drive Countershaft Gears; 11, Clutch Spring; 12, Flywheel.

the engine block by set screws. After the set screws have been removed the bearings may be driven out and the camshaft removed.

When reassembling the engine the greatest of care must be taken that all of the screws are locked, either by lock washers or cotter pins, and set up absolutely tight. In seating the bearings the surfaces must be clean or the bearings will not line up. Bearings should be driven into place, using a piece of wood and hammer, or a lead hammer with a piece of lead or block of wood on the opposite side to take up the jar. Under no condition should the end of the crankshaft be hammered, for the result if the blow was sufficiently great would be a breakage in a short time.

Examining the Transmission.

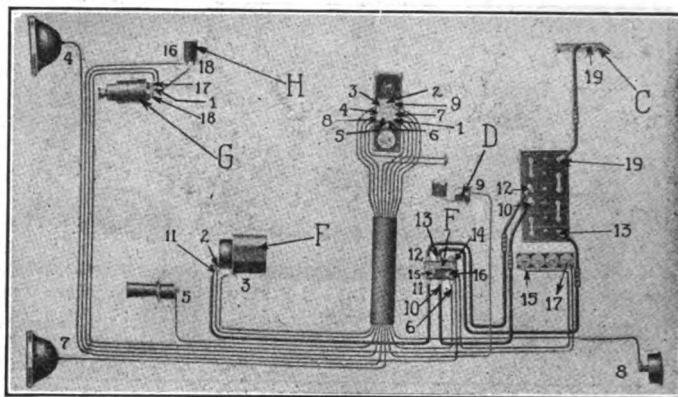
The transmission is of the sliding gear type and the main shaft is in two sections, supported at both front and rear by bearings. The front section, consisting of what is termed the pocket gear, is mounted in large roller bearings and supports the rear section upon roller bearings. Upon this pocket gear is mounted the cone clutch. After the gearset has been removed from the engine the clutch pedal shaft should be removed and the clutch shifter yoke and fork lifted from the case. The clutch drum may then be slipped from the pocket gear for necessary repairs. The rear bearing of the gearset is held in place by a set screw. When this is removed the shaft, with the universal joint attached, may be driven from the case.

The steering gear is in two parts, the upper and lower, and fastened by a coupling. The lower part, which contains the worm and worm gear, may be removed from the frame and given a careful examination.

After the engine has been reassembled great care should be used to tighten the fan belt sufficiently so that it will drive the generator at its rated speed. A good check upon the fan belt action is in the current indicator upon the dash board. Under normal conditions and with the engine running at a car speed of about 15 miles per hour the current indicator will read "Charge." If it does not read "Charge" it is an indication that the generator is not working to standard or that the wiring is at fault. A loose fan belt will occasion a slippage of the generator pulley and the generator will not be driven at the rated speed. The battery will not be kept charged under these conditions.

A wiring diagram of the electrical installation is given herewith. The numbers shown are to identify the terminals of the wires and show the connections. This diagram applies to the high-tension magneto installation. Where the Atwater Kent ignition system is used the coil and magneto is left off, as well as the dry cells, and the wire numbered 1 in the diagram is connected with the breaker box. The secondary wires are arranged in the same order.

The timing gears are marked with a punch so that the camshaft can be correctly set. The intake valves should open



Maxwell Wiring Diagram: C, Frame; D, Regulator Shunt Contact; F (Right), Starter Switch; F (Left), Motor Generator; G, Magneto; H, Ignition Coil; Numbers Refer to Terminals.

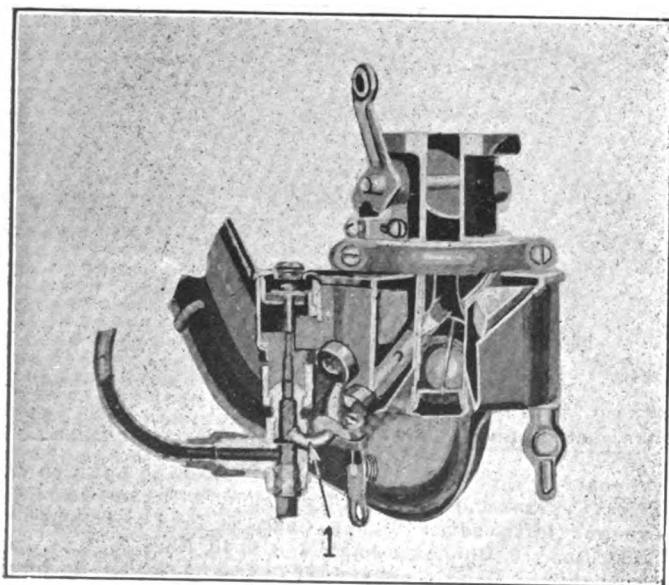
about six degrees after top centre and the exhaust valves will open at about 32 degrees before bottom centre.

To set the magneto turn the crankshaft over with the hand crank until the piston in number one cylinder is at the top of the explosion stroke. (Both intake and exhaust valves will be closed.) Then turn it until the piston has gone down 1/32 inch past the centre. Next retard the spark and turn the armature of the magneto until the distributor is opposite number one distributor terminal (lower left hand corner). Then move the armature either to the left or right until the points of the breaker are just separating. With the magneto in this position couple it to the engine and connect the secondary terminals from the cylinders in the following clockwise order: 1, 3, 4, 2.

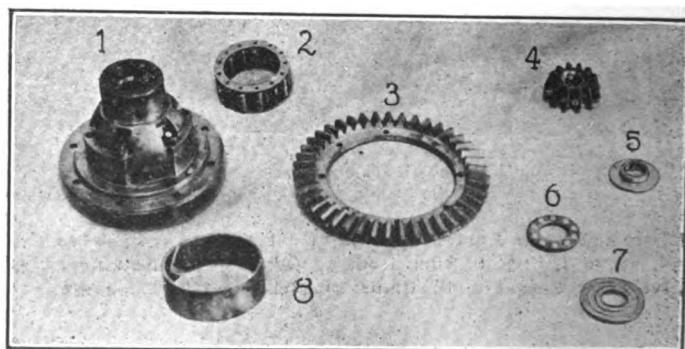
To adjust the carburetor first turn the needle valve to the right until it brings against its seat, then back to the left about three-quarters of a turn.

Start the engine and with the spark retarded close the throttle to an easy idling speed. After the engine has warmed up adjust the needle valve toward the right until the engine begins to slow down, indicating a weak mixture, then toward the left until the engine is running at its best. Next open the throttle two or three notches quickly, and if the engine spits or back fires turn the needle valve to the left until this is overcome. After the adjustment has been made the lock nut should be tightened.

After the engine has been reassembled great care should be used to tighten the fan belt sufficiently so that it will drive the generator at its rated speed. A good check upon the fan belt action is in the current indicator upon the dash board. Under normal conditions and with the engine running at a car speed of about 15 miles per hour the current indicator will read "Charge." If it does not read "Charge" it is an indication that the generator is not working to standard or that the wiring is at fault. A loose fan belt will occasion a slippage of the generator pulley and the generator will not be driven at the rated speed. The battery will not be kept charged under these conditions.



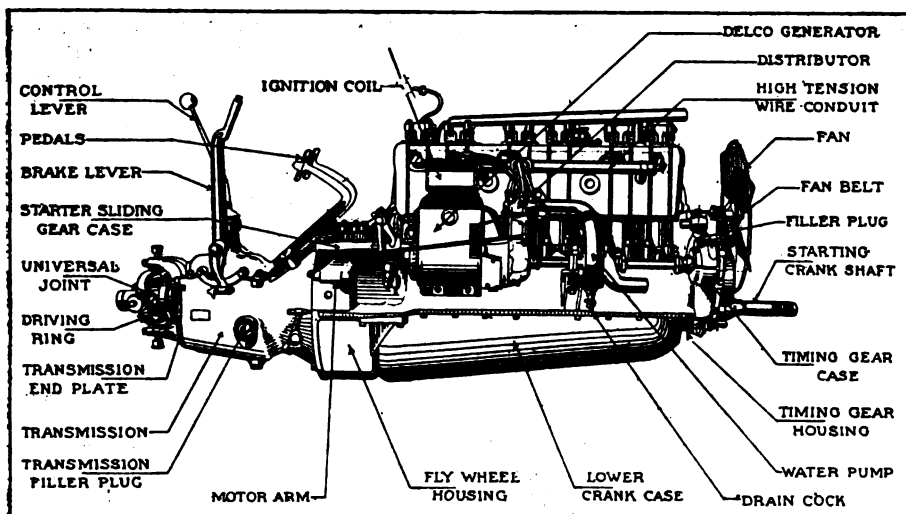
Section View of Carburetor: 1, Needle Valve Adjustment.



Differential Parts: 1, Differential Housing Assembled; 2, Roller Bearing; 3, Drive or Ring Gear; 4, Pinion Gear; 5, Differential Thrust Bearing Outer Race; 6, Thrust Bearing Retainer with Balls; 7, Inner Race; 8, Roller Bearing Outer Race.

BUICK "LITTLE SIX"

(For Practices of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)



Right Side of Power Plant Completely Assembled.

which is geared to the crankshaft running at one-half the crankshaft speed. At the rear of this shaft is another gear, which rotating drives the oil pump located in the lower half of the crank case. The pump shaft revolves at one and one-half times the speed of the crankshaft. This shaft also drives the Delco generator.

The first operation in the overhauling is in grinding the valves. One should start by compressing the valve spring, thus allowing the push rod to become loose, whereupon it may be lifted out. The valve cage nut is next loosened with the Buick special spanner wrench supplied in the tool kit. A light tap from a hammer will suffice to loosen the cage so that it may be withdrawn, care being taken not to injure the bronze packing ring on the top of the valve cage.

THIS article deals with the overhauling of the Buick model "D-6-45," known as the "Little Six," but is also applicable for instructions as to general repair work on models "D-6-44," "D-6-47," as these are all practically the same in mechanical detail.

The water manifold is next removed and all wires and cable connections taken off or tied back on the dash out of the way. These should be properly tagged to assure accurate replacement in original places.

The Stewart vacuum tank is next removed by uncoupling the vent tube, the suction tube to the intake manifold, and lastly, the gasoline line connection leading back to the gasoline tank. This assembly should be laid aside, care being taken not to bend or otherwise injure the copper tubing by accidental contact. The fan is supported by a swinging arm held by a bolt and the tension proportioned by an adjusting nut. Release of this nut allows the fan to become loose and removal of the bolt permits it to be taken from the engine. To remove generator take out the bolts at the base of the generator and those at the rear, which clamp down the cover of the starter gear case. Drive out the pin at the front of the generator shaft and the generator upon which the coil is secured may be removed. The intake and exhaust manifold, together with the carburetor assembly, is clamped to the engine by three arms, each containing two bolts. Removal of the heating tube and the six arm bolts will permit the removal of these parts.

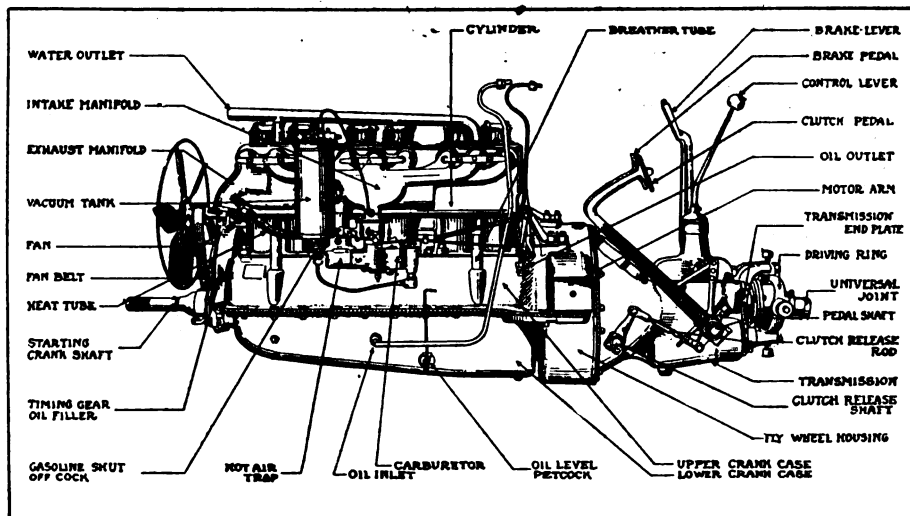
Remove the oil inlet pipe from the dash to the left hand side of the motor and disconnect all dash apparatus from the engine. Unbolt the foot pedals and slip them off. Remove the gear shift and emergency brake and uncouple the universal joint. When the bolts that hold the engine to the chassis are removed the engine and transmission unit will be stripped clean, ready to be swung clear of the frame. The engine is supported on the frame at three points. Pass a chain about the cylinder block and with a hoist carefully lift from the frame, after which the engine can be lowered to a wooden frame made to fit it with an eye towards making each point easily accessible.

The engine has six cylinders, cast en bloc. The valves of the overhead type are opened and closed at proper intervals by the rocker arms and push rods, controlled by the camshaft,

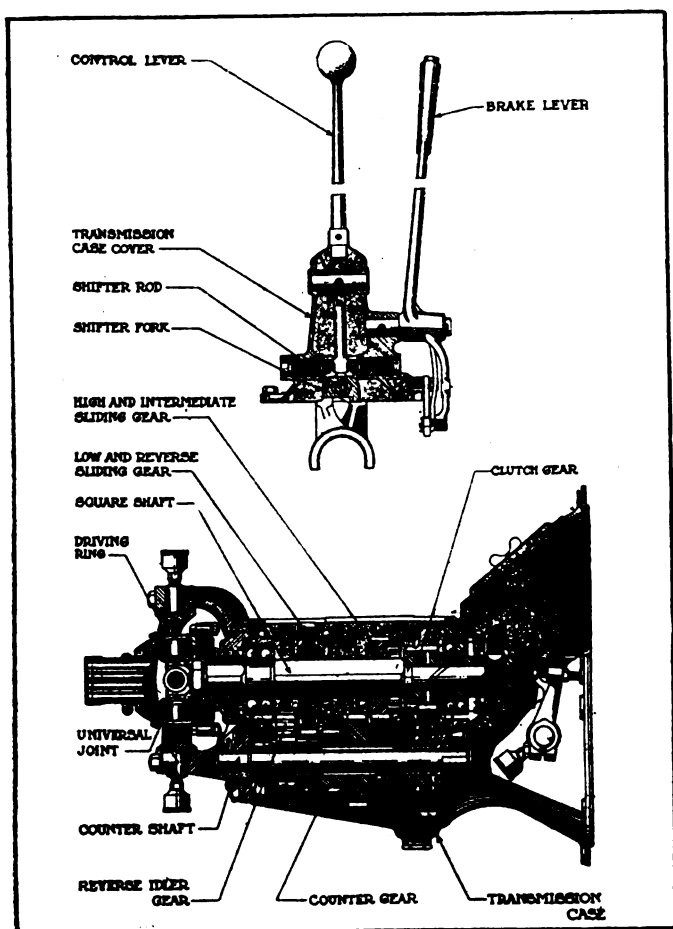
er parts of the crank case and drain the oil into a bucket, where it can be strained and laid aside for future use. Remove all bolts retaining the crank case to the block. Then the case will drop away, bringing with it the gasket. All foreign matter should be carefully scraped from the gasket and the crank case cleaned with a stiff brush and kerosene. The extent to which it will be necessary to go in overhauling the engine will depend upon the examination of the connecting rods and pistons, and if the pistons and cylinders are in bad condition the block may be removed at this time.

The connecting rods may be tested for play by attaching the starting crank and having someone move it back and forth while listening at the base of the block for any sounds that would indicate loose fastenings or worn bearings. The cylinders will act as a sounding chamber for this operation. If a loose connecting rod is detected it can be taken up by removing the cap and taking out one or more of the metal shims. Note that the bearings are bright and show no indication of a lack of lubrication. The bearings should not be adjusted so tightly that they will not permit the piston to fly back when it is brought up against compression with the compression good. When the first bearing is tightened properly, loosen again and adjust the second bearing and so on until each one is finished, each bearing being loose except the one being adjusted at that time. When adjustments are completed tighten as before.

The piston rings are seldom broken, but should fractured



Left Side: Engine, Clutch and Transmission in Unit.



Buick Gearset and Center Control.

rings be found they can easily be replaced by disconnecting the connecting rod caps and sliding the pistons and rods down from above, slipping past the crankshaft when it is turned to the right position. The rings may be slipped on or off the piston by sliding a thin sheet of metal underneath them to prevent their dropping into the grooves until they are in their original positions. It will be noted that the piston pin bearings are offset from the centre and that a small arrow inside the piston edge points towards the offset. When assembling be sure that the connecting rod with the arrow points towards the flat side of the oil dipper. This will bring the piston pin bearing closer to the camshaft side of the engine and on the compression stroke and gas pressure overbalances the piston so that it does not slap under the force of explosion. Practically all the adjustments on the oil pump can be made by the removal of its cover in the lower half of the engine block. This assembly should only need inspection, but should repairs be necessary the pump should be removed and taken to a Buick repair station.

The disc clutch assembly consists of a series of steel plates faced with an asbestos friction material, which are connected alternately to the flywheel or to the clutch shaft of the transmission. Removal of the clutch cover will permit inspection and adjustment of these parts.

When the engine is reassembled in the chassis retard the spark lever to its lowest position and turn the engine one inch past dead center with No. 1 cylinder on the firing stroke. Loosen the timing adjustment screw in the center of the distributor shaft and turn the breaker cam so that the rotor button will be in the position under No. 1 high tension terminal when the distributor head is squarely located. This determines the proper lobe of the cam to time. The cam should be very carefully located so that when the slack in the distributor gears is rocked forward the contacts will be opened by the cam and when the slack is rocked backwards the contacts will just close. Tighten all adjustments and replace the rotor and distributor head properly, locating the tongue in the hold-down clip. The cylinders fire in the following order, 1-4-2-6-3-5.

The Buick manufacturers use the Marvel carburetor and in this type the opening between the mixing chamber and the intake manifold is controlled by the butterfly valve that connects with the throttle on the steering wheel, thus determining the amount of gas being fed to the engine. In the upper part of the mixing chamber and venturi tube are surrounding jackets in which some of the hot exhaust gases passing keep the instrument warm, assisting vaporization of the gasoline. The damper in the jacket opening is connected to and controls the amount of gasoline being fed to the engine. When reassembling the carburetor be careful not to use too much force on the nuts as the threads are easily stripped. Tighten the needle valve by turning to the right until it is completely closed. Turn the adjusting screw of the air valve until the end of the screw is opposite the point of the ratchet spring just above it. Open the gasoline adjustment by turning the needle valve once all the way around. Start the engine, letting it run a few minutes with the air regulator on the dash turned to "hot" until the engine is thoroughly warmed. Retard the spark lever and turn the gasoline adjustment to the right, thus closing the needle valve until the engine idles smoothly. Advance the spark lever, turning the screw adjustment to the left a little at a time, until the engine begins to skip and pop and slow down. When this point is reached turn adjustment to the left until the engine runs evenly. The adjustment can be tested by opening the throttle wide for an instant and then closing. If the engine takes the acceleration the adjustment is complete, but if it pops and skips the adjustment should be slightly turned to the right.

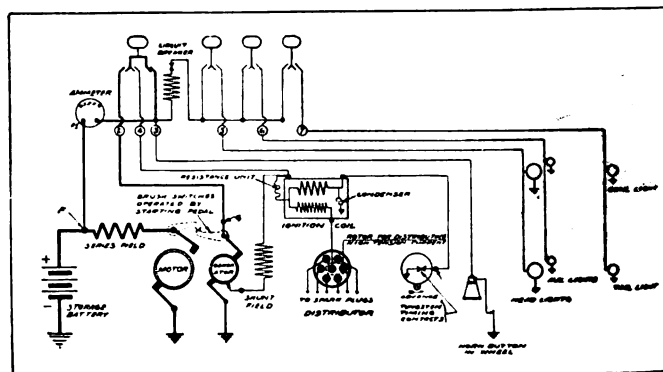
The water pump is of the centrifugal type and is constructed of an impellor with curved blades that is fastened to the shaft, a loose fitting, air tight casting with inlet and outlet connection is fastened to the engine crank case. The impellor revolves, sucking water from the radiator to the center of the impellor and centrifugal force, throws it off at the outer ends of the blades and out of the casing into the cylinder jackets.

To keep the casing tight the pump shaft is held in glands, filled with a prepared wick packing that acts also as a lubricant. These glands must be tightened from time to time as they show indications of leakage. Care should be taken to not get them so tight as to bind the shafting. The bearings of the water pump are provided with stuffing nuts to keep them air tight. These should be repacked with graphite wick when they start to leak.

The rear axle is of the three-quarter floating type and may be entirely taken down without removing the housing from the car.

The steering screw on the steering gear is provided with a ball thrust bearing and adjusting nut at its upper end for the purpose of taking up any back lash or lost motion in the steering wheel. There should not be more than one inch of play in the wheel.

The throw of the brake pedals can be adjusted by means of the turnbuckles in the brake rods. Be sure that the brakes on both wheels are adjusted the same amount. The emergency brakes wear very slowly and adjustments are made by shortening the rods with the turnbuckles. To take up the end play in the driving yoke, adjust by loosening the clamp screw and turning the nut on the forward end of the tube.



Wiring Diagram.

CHEVROLET 490

(For Practices of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

THE Chevrolet 490 chassis is practically unchanged since its initial construction. Nearly all repairs that may be necessary upon the engine, gearset or rear axle may be made without work on the other units.

The engine is of the valve in head type, and, with the head removed it is an easy matter to clean out the carbon and grind the valves without any danger of dropping grinding compound into the cylinders.

Where extensive work is to be done upon an engine work is greatly facilitated by the removal of the radiator. The radiator of the Chevrolet car is fastened to the frame cross member beneath it by two bolts, and having drained the water these bolts should be removed, as should the brace which extends from the radiator to the dash board. The water connections should next be unfastened at the engine, either by removing the hose clamps, or by taking out the cap screws which fasten the iron inlet and outlet to the engine. In the latter case the fan belt must be removed, then the radiator can be lifted from the car.

The gasoline should now be turned off at the tank and the gasoline tube disconnected from the carburetor. The throttle and carburetor control rods should next be unfastened, as should all of the secondary wires at the spark plugs. Four cap screws fasten the intake manifold to the cylinder head. Take these out and remove the manifold from the engine.

Removing Exhaust Fitting.

The exhaust fitting, located at the back of the cylinder head, is fastened to the head by two cap screws. This is next removed, leaving the cylinder head free of all connections.

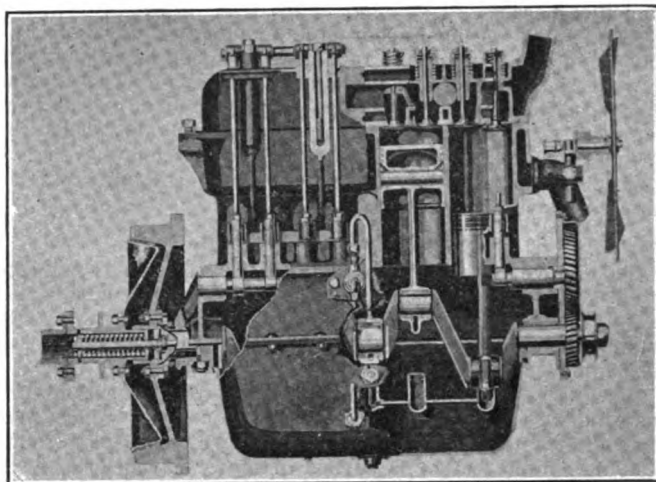
The cylinder head is fastened to the block by four long and four short cap screws. When these are removed the head may be lifted from the cylinder, leaving the push rods on the cylinder block.

Before taking off the push rods each should be marked with a tag showing its location. After the cylinder head has been removed the carbon may be scraped from the pistons and the explosion chamber. The rocker arms are in two sets of four each, mounted on the rocker arm shafts, and are held in place on the shaft by washers and cotter pins. Very little play in the rocker arm bearings results in noise and therefore the arms showing wear should be rebushed. The rocker arm shafts are each held in place by two caps, which are fastened by studs and nuts. The nuts may be removed and the rocker arm assembly lifted from the block.

With the rocker arm assembly removed the cylinder head is placed with the lower part upon a board or table, resting upon the valves. The valve springs may be compressed by pressing down upon the spring washer with a screw driver on one side and the thumb or finger on the other, and when compressed held down by the screw driver, the key through the end of the valve stem can be taken out. The spring may then be removed, releasing the valve, which may be withdrawn through the bottom of the head when the head is lifted from the board.

In Lower Part of Engine.

The engine pan should now be removed by unfastening the bolts which hold it to the frame, exposing the lower part of the engine. The oil in the crank case may be drained by



Cross Sectional View of Engine, Showing All Important Working Parts.

removing the pipe plug in the bottom of the base, or left until the oil pan is removed. After the two pipes leading to the pump have been disconnected and the 14 bolts which hold the pan to the crank case removed, the pan may be taken from the engine, exposing the crankshaft, camshaft, the connecting rods and lower part of the pistons.

The oiling of the Chevrolet engine is by splash, the oil being pumped from the lower part of the base by a plunger pump and distributed through tubes to splash pans located beneath each connecting rod.

After the oil pan has been removed the pipe plug in the oil distributor body should be removed and the body cleaned. In case the car is equipped with a sight oil feed on the dash the piping should be carefully cleaned.

The connecting rods should be unfastened and the pistons removed through the top of the cylinders. Bearings for the connecting rods may be obtained and put into place without removing the pistons if desired, since the babbitt metal is not poured into the connecting rods. The main bearings, which are a special construction, the babbitt being cast in bronze backs, can be replaced upon the removal of the caps of all three bearings and dropping the crankshaft down to permit their insertion. In doing this be sure to support the flywheel with a box or jack so that the whole weight of the crankshaft, flywheel and clutch assembly is not supported by the repairer.

Before the connecting rods or main bearings are put into place for the last time they should be thoroughly lubricated with a good grade of engine oil.

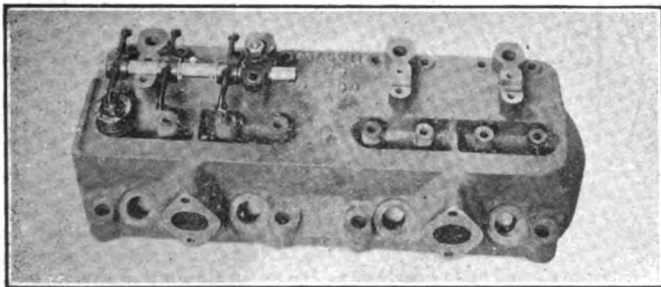
Not only must the connecting rod bearings be scraped in so as to form a wide bearing surface, but in scraping them into place they must be kept in line or "lined up." If all of the connecting rod bearings are to be scraped into place the crankshaft should be removed. The bearings must be scraped so that the piston will stand at right angles to the crankshaft center line.

The engine block may now be unfastened from the chassis by removing the two bolts at the front and the four bolts which fasten the rear section to the cradle like arrangement which supports the clutch and transmission gearset and surrounds the flywheel.

Removing Clutch Assembly.

The clutch assembly may be removed with the engine or separately. If it is removed with the engine the clutch release collar is unfastened from the pedal shaft, or the pedal shaft retaining bolts unfastened and the pedal shaft with clutch release lifted sufficiently to allow the removal of the clutch hub. When this is done the engine with clutch assembly may be slipped forward and removed from the car.

If the engine is to be removed, leaving the clutch in the car, the clutch release collar and pedal shaft bracket should



Cylinder Head with One Rocker Arm Assembly and Valve Assembly in Place.

be lifted as directed above, or removed and the flywheel revolved until the hole passing through the clutch hub is exposed. Then with a nail set, drift, or punch, the clutch spring retaining pin should be driven out. The engine, together with the clutch spring anchor stud, may then be removed from the chassis.

The clutch spring anchor stud is mounted so as to revolve on a ball bearing, the race of the bearing being clamped between the flywheel and the crankshaft flange. The stud is removed after the flywheel has been unbolted and drawn from the crankshaft. If the clutch assembly has been removed with the engine it may be removed from the engine flywheel by driving out the clutch spring retaining pin as directed above.

Removal of the Camshaft.

To remove the camshaft first unscrew the flat head cap screw holding the camshaft gear in place and then pull the gear from the shaft with a wheel puller. After the screw holding the camshaft thrust bushing to the engine block has been removed the camshaft may be drawn from the case.

There is very little liability of wear in the camshaft bearings and no provision is made for replacement, since the camshaft rotates in the engine casting, which is not bushed.

If the clutch leather is burned in spots, frayed, broken or badly worn, it should be replaced. The leather may be chiseled away and the rivets cut and removed and a new facing obtained from a supply house put into place. The tension on the clutch facing expanders must be released before the facing is riveted into place or the clutch facing will not fit properly. In putting the facing on the drum be careful to drive the rivet heads below the surface or engagement will be harsh and not at all dependable.

Handling Clutch Spring Assembly.

It will not be necessary to remove the clutch spring or the anchor stud unless the spring is weak or the thrust bearing is worn. If one desires to remove the clutch spring assembly the whole assembly of clutch drum and clutch hub is placed upon a box or board that has a hole in it of sufficient size to allow the clutch spring anchor stud to pass through. When the clutch drum is so placed that the anchor stud is over the hole, the anchor stud may be pressed downward with a block of wood or metal inserted through the square hole in the clutch hub drive ring. The clutch spring retaining pin may then be withdrawn through the hole in the groove where the clutch release collar is fitted. Before the clutch is replaced the clutch release collar should be removed from the clutch shifter yoke, the oil cover removed and the oil reservoir and oil holes thoroughly cleaned with kerosene and a brush.

The transmission gearset is fastened to the cross member or cradle which surrounds the engine flywheel by two bolts. These bolts must first be removed and the four bolts which fasten the universal joint housing together are taken out. The transmission gearset may then be lifted from the chassis, the universal joint slipping from the driving shaft.

The gearset is disassembled as follows: First remove the four nuts holding the cover and lift off the cover with the gear change lever attached. Unless there are evidences of wear the cover or control mechanism should not be disturbed. Next remove the bolts holding the front ball bearing cover into place; this is the cover surrounding the square driving shaft on the front end of the gearset. The ball bearing race may now be driven from the case, using a piece of wood and a hammer. After the bearing has been removed the main drive shaft, with gear attached, may be slipped through the front end of the gearset case. The universal joint should next be removed from the shaft. It is made in four sections, there being two Y shaped members, which are fitted to the propeller and transmission gearset shafts respectively, and two rings which fasten these Y shaped members together. The rings are bolted together and the removal of the bolts disassembles the unit. The member on the gearset shaft is held by a nut, so this nut must be removed and the part drawn from the shaft. The cap screws holding the universal joint housing to the gearset case are next taken out and the housing removed. The ball bearing at this end of the shaft is removed, as was that on the other end. The drive shaft may then be removed from the gearset, the second speed gear, as well as the reverse and low speed gears, sliding from the shaft inside the case.

The countershaft with the three gears mounted upon it is held into the gearset case by a cotter pin passed through the front of the shaft and casing. After this pin has been removed the shaft may be slipped from the gearset, leaving the gears in the case. The idler shaft is held into the casing by a pipe plug. When the plug is removed the shaft may be withdrawn from the gearset, leaving the reverse idler drive gear and the driven gear in the case.

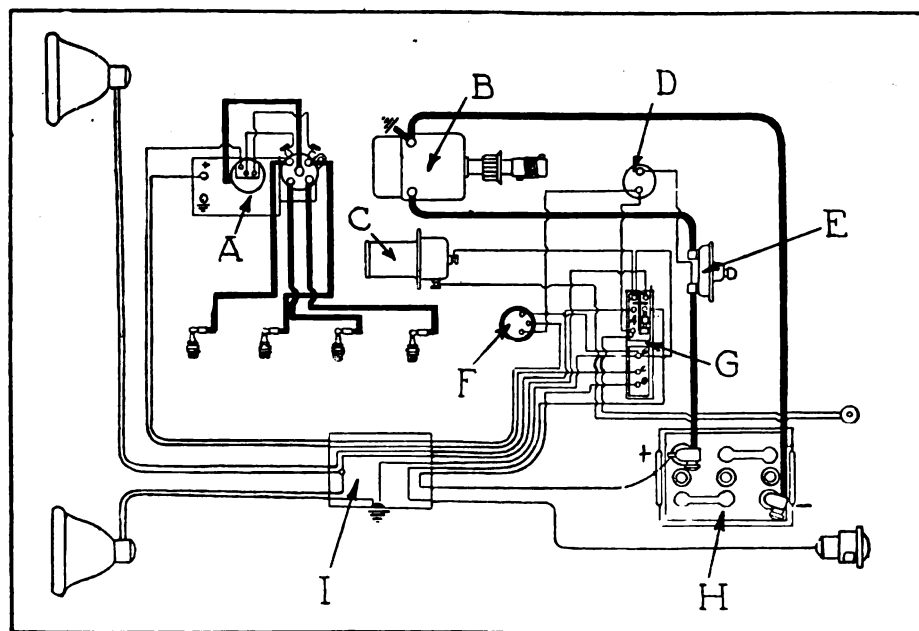
The steering knuckle is mounted on the front axle and pivots upon the knuckle bolt or king pin. The king pin is held into place by a castellated nut, which must be removed and the king pin driven up through the axle fork, permitting the removal of the knuckle. Every part should be carefully examined and the oil completely cleaned so that no breaks will be overlooked. The oil channel in the king pin should be cleaned. The steering knuckle bushings should be a snug fit upon the king pin, and if there is play, either the bushings should be replaced or both the pin and bushings replaced.

As a general rule the generator or starting units require

no attention beyond oiling and exterior cleaning, and should serious trouble develop in either unit it should be sent to a branch station or the factory for repair. Before putting the starting motor into place the teeth on the pinion gear, as well as those on the flywheel, should be thoroughly cleaned and examined for breaks or badly worn teeth. The pinion gear on the motor should be oiled or greased so that it will turn easily on the motor shaft. All wiring connections should be made as shown in the accompanying diagram. The connections and terminals should be scraped so that the electrical connection will be positive. The whole wiring system should be carefully examined and frayed wires either replaced or thoroughly insulated with electrician's tape.

If care has been used in reassembling and meshing the timing gears, the timing wires need not be changed. Should the engine require retiming, however, the following directions should be observed:

The timer and distributor unit should be assembled and the wires



Wiring Diagram of Chevrolet Starting, Lighting and Ignition System: A, Generator; B, Starting Motor; C, Horn; D, Ammeter; E, Starting Switch; F, Circuit Breaker; G, Ignition and Lighting Switch; H, Battery; I, Junction Box.

connected with the distributor. The secondary wire from No. 1 cylinder should be connected with the terminal which is nearest one when standing at the side of the engine. The terminals should then be connected in a clockwise order as follows: 1, 2, 4, 3.

The crankshaft should next be revolved with the hand crank until the piston in No. 1 cylinder is at the extreme top of the firing stroke, which can be determined by inserting a piece of wire in the spark plug hole. The spark lever should then be connected with the distributor body and set at about

one notch advanced.

The two wires to the breaker box are now connected and the secondary wire from No. 1 cylinder slipped from the distributor terminal. Turn on the ignition switch and turn the timer distributor shaft clockwise (the lock nut of which has been loosened), holding the secondary wire near to its distributor socket. When the shaft has been turned to a point where a spark passes between No. 1 secondary wire and its distributor socket, the lock nut on the shaft should be tightened and the setting is complete.

HUPMOBILE

(For Practices of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

THERE have been a number of changes made in the past three years in the Hupmobile design, embodied mostly in the engine. Model K, which came out in 1915, differed materially from model 32 of the three years previous. Model N, or series N, as it is termed, was produced in 1916, and continued through the present year. Series N has no great differences from K, so that this article will cover both model K and series N machines.

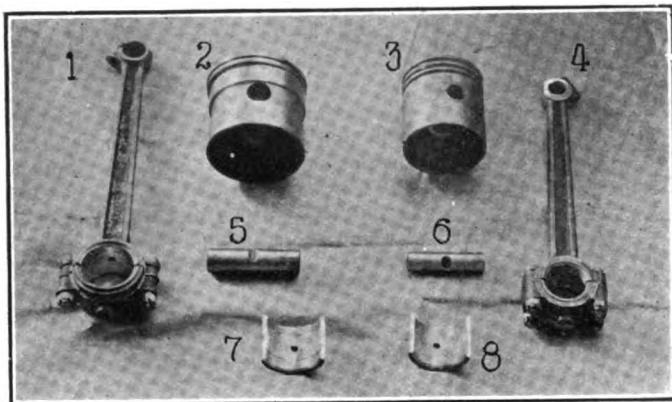
The chief point of difference between models K and N is the use of the single unit starting and lighting system on model K. The fan on this model is mounted on the engine block and driven by a flexible belt from a pulley, which in turn is driven by a silent chain. On model N the fan is mounted on the timing gear case and driven direct by the silent chain. Aside from this difference the mechanical construction is similar; though there were certain changes in sizes of bearings, wristpins, valves and piston construction, the general directions for overhaul may be applied to both types.

In the Lower Part of the Engine.

Drain the oil from the base of the engine by removing the drain plug located in the lower part of the flywheel housing and remove the oil pan. This will expose the lower part of the engine and the flywheel, in which is mounted the clutch.

Two types of connecting rods have been used, the first having a cap retained by four bolts, while the later type was fitted with but two. After the caps have been removed the connecting rod may be taken from the crankshaft and together with the piston removed from the engine through the crank case. The bearings for both types of connecting rods are babbitt cast in bronze liners. If the babbitt has been worn to a great extent the bearing should be replaced with new. For small adjustments the removal of one or more shims permits the tightening of the rod upon the crankshaft.

Supporting the crankshaft are three main bearings. The caps of the two outside bearings, or the ones at the ends,



Two Types of Pistons and Connecting Rods Used on Series N and Model K Engines. 1, 4, Connecting rods; 2, 3, Pistons; 5, 6, Wristpins; 7, 8, Bronze Babbitt Connecting Rod Bearings.

are held by four nuts each, while the middle cap is retained by two nuts. These caps may all be removed and adjustments made without disturbing the crankshaft, though it is advisable to remove them one at a time, leaving the other two in place until the third is replaced.

As a general rule it is advisable to replace both the top and bottom bearing rather than to replace the cap only, since the wear is apt to be evenly distributed.

If the work of overhaul is to proceed any further the generator, motor, fan and oil filler cap or vent tube should be removed. These units are all retained on the engine by nuts or cap screws and may be removed very easily. Where the generator unit is driven by a silent chain the chain may be slipped from the sprocket when the generator bolts are taken off.

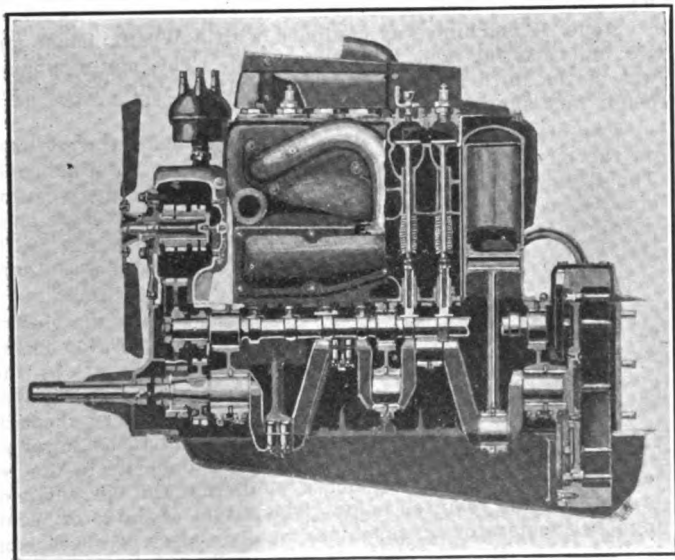
Removal of Engine from Chassis.

For further work on the engine it should be removed from the chassis. This may be done, together with the transmission gearset, or the engine may be removed separately. If the gearset is to be removed from the engine it should be disconnected from the rear system.

The engine is supported at three points in the chassis. At the front end are two long bolts, which should be removed. The rear is fastened to the frame at the sides only. In order to slip out the engine it will be necessary to unfasten the steering gear from the frame and twist it to one side or lift it from the frame. When this is done the engine should be supported by a block and tackle. If the gearset is to be left in the chassis it should be blocked up either with boxes or horses so that the entire weight will not be brought upon the drive shaft. After the bolts which fasten the crank case to the transmission gear case have been removed, the engine may be lifted from the frame. If the facilities for lifting are inadequate the cylinder block, which is retained by six nuts on six studs, two at the front, two at the rear and two between number two and three cylinders, may be removed from the crank case. Then the crank case may be taken from the chassis.

Taking Apart the Timing System.

With the engine removed from the chassis the next step



Hupmobile Series N Engine, Partially Cut Away to Show Construction.

is the disassembly of the timing mechanism. The camshaft timing chains are enclosed in the front housing by two covers on the model N engine, a top housing which forms the fan drive enclosure and a bottom cover over the cam and crankshaft gears. On the model K engine the covers are divided across the center, and may both be removed at this point. Only the lower cover of the model N can be removed at this time. With the covers of the model K removed the adjustable eccentric on the fan drive pulley shaft should be turned until the chain is slack, then the chain may be slipped from the sprockets. When the lower cover of the model N is taken off the driving chains are exposed. In the later models of series N the chain is fitted with a master link, which may be disconnected, permitting the removal of the chain. In the earlier models, however, there is no master link, so that it will be necessary to cut off one of the rivet heads before the chain can be taken from the machine. In replacing silent chains be sure to have the arrows, stamped on the links, point in the direction of the drive, or the chain will soon wear out. Care should be exercised in replacing the link to have it bear the same relation to the chain as it did before removal.

After the chain has been removed from the model N machine the upper housing, which carries the fan, may be unbolted and removed. The fan is keyed to the shaft and retained by a nut. After the fan has been taken from the shaft the eccentric bearing is exposed, retained by the fan bracket. This bearing should be replaced, if it shows wear, since it will cause considerable noise, if there is any play in the shaft. The fan belt pulley of model K machine is retained on the shaft by a nut located in the pulley. When this nut is removed the pulley may be pulled from the shaft with a wheel puller and the shaft may then be withdrawn from the front of the housing.

Points on Removing the Crankshaft.

After the chains have been removed and crankshaft bearings taken off, the crankshaft may be removed from the engine. The flywheel is fastened to the crankshaft by cap screws. It is essential that the flywheel is firmly fixed to the shaft or a knock will result. If there is any play the cap screws should be removed and larger ones substituted. The camshaft is retained by a thrust washer, which is located in the front of the case, directly in back of the distributor drive gear. This thrust washer is fastened in place by two nuts on two studs, and must be removed. The camshaft may then be pulled from the case toward the front. Unless the crank case is turned upside down the tappets will fall against the cams and cause trouble. The three camshaft bearings

are retained by set screws, which are located in the top of the crank case, directly above the camshaft center line.

Unless there are signs of extreme wear none of the timing sprockets need be removed from their respective shafts. The outside sprocket on the camshaft is retained by a nut and keyed to the shaft; it may be removed with a wheel puller. The small gear on the camshaft is retained by a pin in the hub; when this pin has been driven out the gear may be pulled from the shaft. Both the gears on the crankshaft may be pulled off with a wheel puller after the left hand nut has been taken from the end of the shaft.

The transmission assembly should be removed from the car. After all of the control rods have been taken off the cover upon which is mounted the speed control should be unbolted from the housing and the steel cover over the universal joints slipped back, exposing the bolts holding the joint together. When these bolts have been taken out the transmission with clutch may be taken from the chassis. The drive shaft assembly is disconnected from the rear axle in the same manner.

The steering gear housing is in two sections, the lower or main part carries the steering arm and is bolted to the frame; the upper part, which is retained by four screws to the main housing, carries the thrust bearing and steering column. This part should be taken from the main housing, allowing the removal of the steering column, together with the sliding blocks. As this assembly is taken from the housing the blocks separate from the worm. The rest of the mechanism may be exposed by removing the cover plate on the side of the main housing.

Timing the Motor.

In replacing the silent chain on the timing sprockets it is essential that the camshaft and crankshaft bear the proper relationship to each other. The proper setting may be determined from the markings on the flywheel. Turn the fly wheel until the mark E-C, 1-4 is directly on the top and turn the camshaft in a counter clockwise direction until the exhaust valve of either one or four cylinders is just closing, then put on the chain. To check up this timing turn the engine over until the piston in number one cylinder is at the top of its stroke. The exhaust valve on number four cylinder should be just closing and the inlet just beginning to open.

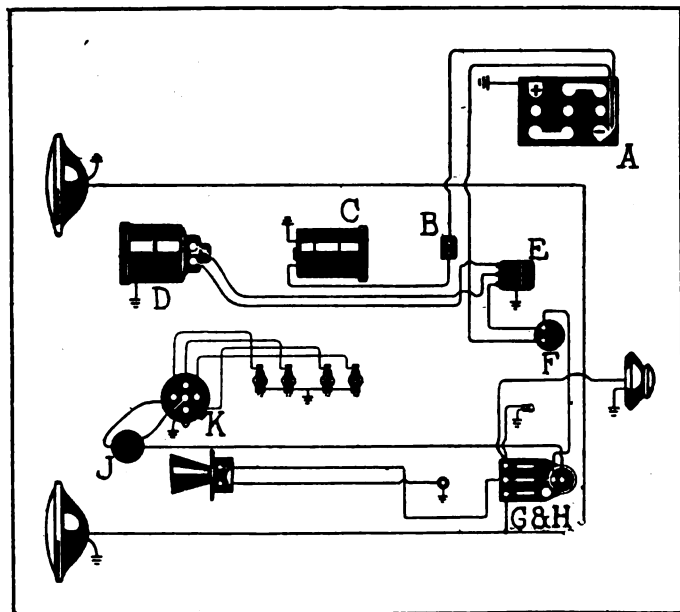
The ignition system is the Atwater-Kent, the adjustments of which are given in the General Power Plant Overhaul. However, on cars fitted with the manual control the spark lever should be in a horizontal position, the two nuts on the control rod connecting the distributor loosened and the engine timed as directed for the automatic advance.

The carburetor is a Zenith and beyond cleaning requires no adjustments. Both the main and compensating jet have certain sized openings, made at the factory, so that unless the jet is replaced with a new one there cannot be any change made.

Model K machine was equipped with a Westinghouse single unit starting and lighting system. The motor-dynamo was of the third brush type, with grounded wire, the wiring being very simple.

Two electrical systems for starting and lighting were used on the model N machines, the Bijur and the Westinghouse. The Bijur equipment covers cars up to 60,000, the Westinghouse from 60,000 on. Two styles of switchboards were used on the Westinghouse system, the first on cars between 60,000 and 75,000; the second style having three fuses only, on cars after 75,000.

The output of both the Westinghouse single unit electrical system on the model K car and the Bijur generator on the model N machines is controlled within certain limits by the position of the third brush. If the current generated is over 12 amperes there is danger of ruining the battery through overcharge, and it is essential that the output be lowered. This is done by swinging the third brush opposite to the rotation of the armature to such a point that the current generated is at the required point. The output of the later Westinghouse generator on machines number after 60,000 is controlled by a current regulator unit, indicated in the wiring diagram by the letter E. The adjustment of this unit should be made only at a service station.



Wiring Diagram for Westinghouse System, Cars After 75,000. A, Battery; B, Starting Switch; C, Starting Motor; D, Generator; E, Voltage Regulator; F, Ammeter; G and H, Ignition and Lighting Switch; J, Spark Coil; K, Distributor.

OLDSMOBILE EIGHT

(For Practices of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

BOTH model 44 and 45, 1916 and 1917 Oldsmobile cars are built upon practically the same design, aside from changes in sizes and the counterbalanced crankshaft in the model 45, there are but two real points of difference that require a change in detailed directions from overhaul. These differences are in the fan and generator mounting and in the oil pump. The generator on the model 44 is bolted to the back of the timing gear housing and is driven by a chain, while the generator on the model 45 rests upon the top of the gear housing, carries the fan and is driven by a belt from the crankshaft. The oil pump on the 44 is in the timing case rather than on it, as is the 45.

For an eight-cylinder V type engine this machine is extremely simple and practically all parts are accessible for repairs.

Disconnect and remove the two water tubes which lead from the cylinder heads to the carburetor manifold jacket, and after the secondary wires have been disconnected from the spark plugs and the studs removed, the cylinder heads may be taken off, exposing the cylinders and firing chambers. Scrape off all carbon and clean the water jackets in both the heads and cylinder blocks with a stiff wire.

If the overhaul is to be extensive the carburetor and manifolds may be removed. Two types of manifolds were used on the model 44, one was continued and used on the model 45. The first type of intake manifold was not fitted with a water jacket and was straight across the top, having the carburetor bolted to a flange underneath. At each end flanged elbows make the union between the manifold and the combination exhaust and intake manifold.

The later 44s and all 45s were fitted with a combination water jacketed intake manifold which was fastened directly to the intake-exhaust manifolds by cap screws. The combination intake-exhaust manifolds were bolted directly to the exhaust pipe, which in turn was fitted and connected with the pipe leading to the muffler by a union. All of the manifolds and exhaust pipe back to the muffler pipe should be removed, leaving the engine clear for further repairs.

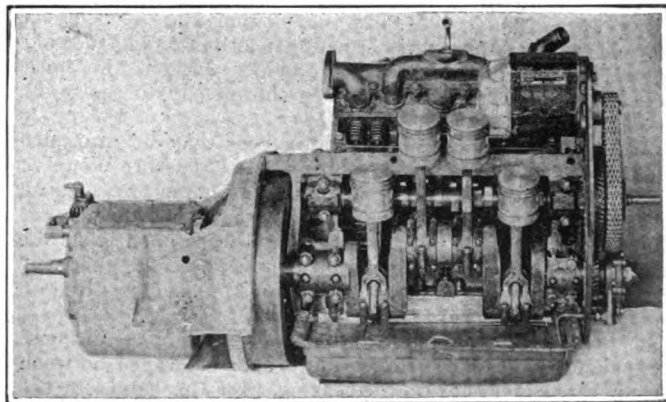
Before disconnecting the manifold or carburetor, the vacuum tank cock should be shut off and the gasoline drained from the carburetor. The control rods to the carburetor may be disconnected at the carburetor end and lifted out of the way.

Removing Valves.

The conventional U shaped lock washer is used for retaining the valve springs and spring cups. The removal of the springs may be accomplished by compressing the springs with a valve spring compressor, the removal of the U washers and the lifting out of the valves.

Taking Off Generator and Fan.

The next step in the overhaul is the removal of the generator and fan assembly. Disconnect the wires at the storage battery and after tagging all wires unfasten them from the generator, coil and starting motor. Remove the distribu-



Model 44 Engine With Left Hand Block Removed; Showing Crank Case Arrangement, Pistons and Connecting Rods.

tor head and lift off the secondary cable enclosures, together with the wires.

On the early model 44 the generator is bolted to the back of the timing gear case. Remove the bolts and cap screws and this unit can be taken from the engine. After the fan oil tube (first few cars only) has been disconnected from the timing gear case remove the four cap screws which fasten the ignition unit and fan housing body to the timing gear case and remove the ignition fan assembly. After the two cap screws on the ignition unit have been removed this unit may be lifted off.

The fan on this model is keyed to the shaft and retained by a spring lock washer, which may be pried open and off with a screw driver. The fan may then be pulled from the shaft with a wheel or gear puller. Both fan shaft ball bearings are retained by plugs, which are threaded into the housing. When these plugs have been unscrewed the bearing outer races may be driven out from the inside, if necessary, with a wood rod and hammer.

On the latter 44s, though the generator was bolted to the timing gear case in the same manner, the fan and distributor unit were somewhat differently arranged. In this model the timer unit is removed by unscrewing the set screw in the timer housing and lifting the whole unit out of the base. The fan housing may be unbolted from the timing gear case and removed. The fan on this model is fastened by a key and nut on the end of a sleeve and may be removed with a wheel puller if necessary.

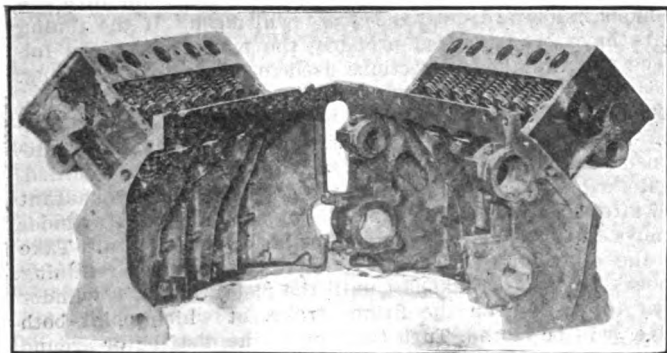
Should the ignition unit, coil or generator require repairs, they should be either returned to the factory or carried to an electrical expert.

The generator and fan unit of the model 45 is mounted on a swivel bracket and to remove the unit take out the wing nut bolt at the top of the strap which binds the generator. The generator may then be lifted from the engine, with the timer-distributor attached. This last unit is retained by three nuts on long bolts passing through the generator. Only the nuts need be removed.

Water Circulation.

Both models were fitted with centrifugal pumps, which may be removed after the water inlet and outlet connections have been disconnected, and on 45 after the two cap screws fastening the pump body to the block have been removed.

The pump shaft or rotor on model 45 is driven from the camshaft through a clever little device that protects the pump from damage due to frozen water. This device is a semi-split clip, which fits into slots in both the cam and pump shaft and will break in event of a freeze up, before undue strain is put upon any of the rest of the cam or pump mechanism. One should exercise due care in replacing the pump to be sure that this split clip is in place or the pump will not function.



Engine Blocks; Showing Integral Construction of Cylinder Blocks and Crank Case; Also Main and Camshaft Bearing Arrangement.

Lubrication on both models is had by a gear pump. In model 44 the pump is mounted directly upon the crankshaft. The oil pump on model 45 is located below the crankshaft on the timing gear case. To remove it disconnect the two oil tubes and remove the cap screws which fasten the pump to the case. The pump may then be pulled downward and forward and removed.

For connecting rod repairs the oil pan may be removed from the base of the engine, though it is impossible to make any repairs to the crankshaft bearings through the base. Take out the 20 bolts which fasten the oil pan to the crank case and remove the pan.

Through the base the connecting rods may be examined and removed if necessary. The connecting rods are mounted in pairs, or two upon one crank pin. The outer or Y shaped rod carries a long babbitt faced bronze bearing, which is retained by two connecting rod straps and is scraped to fit the crank pin. The inner connecting rod is clamped upon the bearing, between the ends of the outer rod, and is fitted to the groove in the bronze faced bearing.

In fitting the connecting rods to the crank pin the outmost care should be observed to get the proper clearance between the inner rod and the bronze bearing. Fit the babbitt to the crank pin in the outer or Y rod in the usual manner by scraping. Then wind a piece of shim stock, three-quarters of an inch wide and not over .0015, preferably .001 of an inch thick around the bronze bearing, but do not lap it over. Next clamp the inner rod over the shim stock around the bearing and shim it until the fit is tight, but does not bind. Then remove the rod and the shim strip and after replacing the rod again the fit will be .002 larger than the bronze bearing.

The valve lifters are mounted in a detachable cage or frame and may be removed from between the blocks at this point. The push rod assembly may then be removed from beneath. The rolls on the push rods and the pins upon which the rolls are mounted should be carefully examined for wear in the pins will be apt to cause uneven valve action.

Removing the Engine.

If further repairs are necessary the engine must be removed from the chassis. After the clutch release arm has been disconnected, the crank case bell housing bolts removed and the transmission supported by means of suitable blocking, the engine retaining bolts should be taken out and the engine, by means of block and tackle, lifted forward and upward until free of the chassis.

On the model 44 remove the four cap screws which retain the hand crank sleeve and take off the cranking device. The front engine swivel hanger bearing may then be removed. On the model 45 the crank ratchet should be removed and the fan pulley pulled from the shaft with a wheel puller. The front timing gear case may then be unbolted and removed, exposing the timing gears, and the pump on model 44. The crank ratchet nut should next be unscrewed (from model 44).

Disconnect the oil tubes from the oil pump on model 44, and with the crank ratchet lock nut out of the way unscrew the crank ratchet and slip the pump from the shaft.

The camshaft timing gear and generator drive sprocket are keyed to the shaft and retained by a collar screwed to the

camshaft. When the collar is removed both gears may be pulled off if necessary with a wheel puller. The timing gear on the crankshaft is also keyed, and may be pulled off in the same manner.

A feature of this engine consists of the split crank case casting. Each cylinder block is cast integral with half of the crank case and the parts are bolted by lateral bolts at the top. The right side carries the main and camshaft bearings. The next step in the disassembly is the removal of the left casting. When this is done all necessary repairs may be made to the camshaft or main bearings. The removal of the main bearing caps permits taking out of crankshaft.

A careful inspection should be made of the flywheel retaining screws, and should the flywheel be loose upon the crankshaft flange the screws should be examined. It is essential that the cap screws at this point fit the holes in the flywheel; if they do not new cap screws should be used when reassembling.

In removing the clutch assembly from the flywheel the four clutch springs must first be released. These are retained upon studs in the same manner as the valve springs by U shaped washers. The springs may be compressed with a Y iron, using a length of rope around the engine block as a fulcrum. When the springs have been removed the clutch cone may be taken out.

The clutch spring support is retained in the flywheel by a ball thrust bearing, the inner race of which is fastened to the crankshaft by a retaining nut, screwed to the crankshaft extension stud.

After the cover has been taken from the transmission and the universal joint back of this unit disconnected, the transmission may be removed from the chassis.

Disassemble the universal joint and remove the retaining nut on the end of the main gearset shaft. The universal joint flange may then be pulled from the shaft. Covers over the main shaft bearings permit the removal of the bearings. Remove the covers, each of which is retained by four cap screws, and the two parts of the main shaft may be removed, from the front and rear, leaving the sliding gears in the case. A castellated nut, mounted on the end of the countershaft retains that member in the case. Remove the cotter pin and nut and the countershaft may be pulled out from the back of the case with a wheel puller, leaving the four gear combination in the case. The reverse idler pinion gear is exposed upon removal of the cover plate on the right side of the transmission case and retained by a set screw and lock washer on the side of the casing.

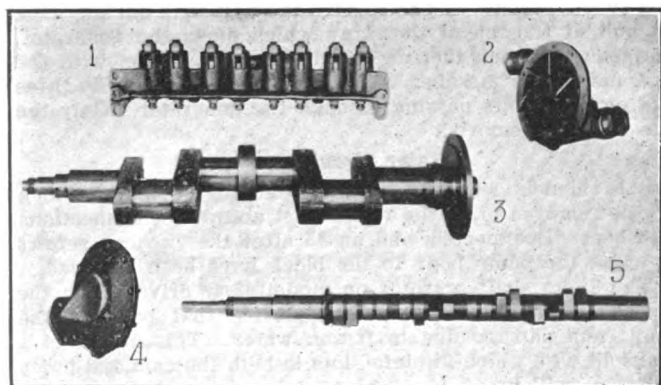
The steering gear is of the worm and half nut type and is easily disassembled by the removal of the top cover and side plate. End play of the steering column and worm is adjustable through a nut on the upper end of the steering gear.

Timing and Adjustments.

The timing on both models should be adjusted before the engine is replaced in the chassis and before the timing gear case cover is replaced. Turn the camshaft in a counter clockwise direction until the intake valve in No. 1 cylinder (first cylinder on the left, facing engine,) is about to open, then turn crankshaft until the piston No. 1 cylinder is past the top center and just started on the down stroke, replace the timing gear. If the teeth do not mesh at this point turn the crankshaft forward until the gears will mesh. If the timing gears have been marked properly the marks should be followed and the above directions used to check up the setting.

Model 45 was fitted with an automatic spark advance mechanism, but model 44 was not; in either case the ignition unit setting remains the same and the engine is designed to fire at dead top center with spark fully retarded.

Retard the spark lever on the steering wheel quadrant and after locating the secondary lead wire for No. 1 cylinder remove the secondary or distributor head from the unit. Take off the distributor brush and unscrew the cam retaining screw. Turn the crankshaft until the piston in No. 1 cylinder is at top center on the firing stroke, at which point both valves will be closed. Turn the cam in the distributor around in its normal direction of rotation until the breaker points snap apart and the distributor brush can be put in place beneath the segment connected with No. 1 cylinder wire. Then tighten the cam retaining screw.



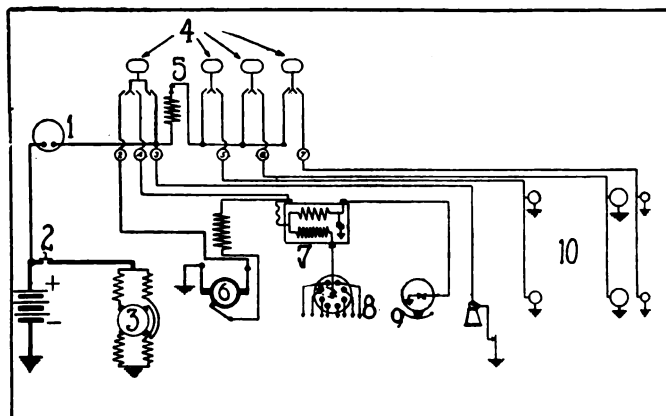
Model 44 Engine Parts: 1, Valve Tappets and Cage; 2, Water Pump Body and Rotor; 3, Crankshaft; 4, Water Pump Cover; 5, Camshaft.

Two types of carburetors were used, very similar to each other, the first being fitted with a low speed adjustment that was later discontinued. To adjust these carburetors open the needle valve about one-half a turn from its seat and close the low speed adjusting screw.

Start the engine and allow it to run until it has warmed to operating temperature, then close the needle valve as far as possible without slowing down the engine. If upon quick acceleration the engine back fires, open the needle valve until the fault is corrected. If upon rapid acceleration the action is sluggish it is an indication of too rich a mixture and the needle valve should be closed slightly.

The low speed adjustment should be made so that the engine can be throttled down to its minimum speed and is made in conjunction with the adjustment of the throttle stop screw.

The front wheels are mounted upon roller bearings in the conventional manner. When these wheels are replaced be careful not to adjust the bearings too tightly or they will soon be destroyed. A roller bearing to give good service should have a slight amount of play.



Wiring Diagram: 1, Ammeter; 2, Starting Switch; 3, Starting Motor; 4, Ignition and Lighting Switches; 5, Generator Cut-Out; 6, Generator; 7, Ignition Coil; 8, Distributor; 9, Timer; 10, Lighting Circuits.

CHALMERS 6-30

(For Practices of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

ALTHOUGH there have been a number of changes in design on the Chalmers 6-30, models 35A, 35B and 35C are so very nearly alike that the main practises of overhaul on the latest model will apply to all, excepting that where differences in design require a separate explanation of disassemble and reassembling are given.

The engines of these models are of the L head type, fitted with removable cylinder heads, and have the valves on the left side of the block. Cooling is by thermo syphon.

Models 35A and 35B cylinder blocks were designed to have the carburetors mounted on the right side of the blocks, the manifold passage passing between the third and fourth cylinders and thence branching off to the various intake passages. Model 35C, however, is fitted with both intake and exhaust manifolds mounted on the left side of the engine.

Models 35A and 35B timing gears were direct gear driven, while those of 35C are driven by silent chain. The distributors or timer units on the models 35A and 35B were driven from a gear on the left side of the engine and are located on a vertical shaft mounted between the generator and timing gear case. The distributor on the model 35C is located on the right side and is mounted directly upon a vertical shaft upon the generator, both of these units being driven by the timing gear silent chain.

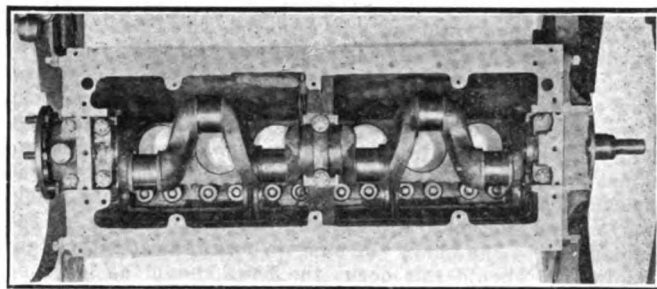
The oil pumps on models 35A and 35B were driven from the timing unit and located beneath that unit, while the pump on model 35C is driven from the generator shaft and mounted upon the generator.

The transmission gearsets of the three models are practically the same, and though the clutches differ in construction they are disassembled in practically the same way. Though the rear axles are the same, the differential construction differs; those of models 35A and 35B are two pinion differentials, while the 35C is fitted with three. The directions for disassembly are the same, however.

After the rod to the dash and water hose have been disconnected, remove the radiator.

Tag the secondary wires, leading to the spark plugs, and disconnect them from the plugs. The cap screws retaining the cylinder head should next be removed, and the cylinder head taken from the block. With a screw driver or putty knife, and a scratch brush, clean all carbon from the engine. Frequent applications of kerosene oil will soften the carbon and facilitate the cleaning the engine.

Before removing the cylinder heads from models 35A and 35B, the carburetor hot air intake should be unscrewed from the hot air stove and removed and the distributor or timer unit taken off. This unit is retained in the housing at the lower end by four cap screws and at the top by a bracket bolted to the cylinder block.



View of Engine from Underneath, Showing Crankshaft Bearings and Push Rods in Place.

The valves are retained by split washers and spring caps in the usual way and may be removed by compressing the springs with a valve spring lifter, removing the split washers and slipping the valves out from the top.

The utmost care should be observed in keeping the valves in their proper places, and it is inadvisable to interchange them. Each valve should be given a careful inspection, and it is essential that the valve stems fit the guides very closely. A loose valve guide results in loss of power and inefficiency. The valve guides in the Chalmers engine may be driven out from the top with a bar of iron, slightly smaller than the outside diameter of the guide.

After the oil has been drained from the base the lower part of the crank case should be removed. On the model 35C the oil tube leading from the oil pump to the base should first be disconnected at the base end.

With the oil base removed from the engine the connecting rods and main bearings may be examined. Such is the construction of this engine, that unless the main bearings need replacement, the crankshaft or the cylinder block repairs, it will be unnecessary to remove the engine from the chassis. A careful examination at this point should determine this.

Connecting Rod Removal.

The connecting rods and piston assemblies are removed through the top of the cylinder block after the connecting rod caps have been taken off. It is always advisable to replace pistons in their proper cylinders, rather than to change them from one cylinder to another. Unless the babbitt shows much wear, or is broken at any point, adjustment of the connecting rods may be made by the removal of shims.

Unconventional Push Rod Mounting.

The push rods are mounted in cages, which are cast in two parts, each section holding six push rods. The sections

are retained by cap screws, which should next be removed and the cages taken from the engine. The push rods may then be slipped from the cages and examined. It is essential that the push rod rollers are absolutely round and fit the roller shafts tightly or the action will be noisy. Replacements should be made at this point if necessary.

The fan assembly and belt should be removed next in order. The fan drive pulley on the crankshaft is retained by a large nut, which is locked by small set screws. This nut is removed and the pulley pulled from the shaft. With the pulley out of the way the timing gear case cover should be taken off, exposing the gears or chain as the case may be.

At this point in the overhaul of the model 35C the generator and timing unit should be removed. To do this, first disconnect the oil pump tubes at the pump, and after tagging the ignition wires, disconnect them from the units. Only those wires leading from the units to the chassis need be disconnected, however.

The generator unit on model 35C is retained on the timing gear housing by three cap screws, the two upper screws being clamp screws and fitted in slots on the generator flange. The generator unit swings upon the lower cap screw, and so arranged that by moving it upon the lower screw as a pivot the drive chain may be adjusted. The three cap screws should be removed and the generator, with oil pump, distributor unit and coil removed. The driving chain may then be removed.

Adjusting Generator Chain.

When the generator unit is replaced care should be observed not to get the driving chain too tight, or it will be noisy. Clamp the generator in place with the lower cap screw and swing the top back until the chain is tight. Take up one of the upper cap screws, just enough to bind the generator in place, and with a light hammer or wood block tap against the side of the generator until the tension is removed from the chain, but not enough to cause any chain slack. Then tighten all bolts and run the engine, listening to the sound made by the chain. A hum or buzz indicates too tight a chain, and should this occur the bolts should be loosened slightly and the generator tapped over with a hammer, being careful not to permit too much looseness in the chain.

The camshaft gear is fastened to the camshaft flange by four cap screws, which are kept from backing out by the bent over lugs on two retainer strips. Unless the gear or shaft shows wear the gear need not be removed, for the whole camshaft may be pulled out of the engine from the front. The camshaft end bearings are retained by set screws from the outside.

The timing gear on the crankshaft is keyed on and may be pulled from the shaft with a wheel puller. The whole timing gear case may then be removed if necessary to take out the crankshaft.

On the models 35A and 35B the generator should be uncoupled at the coupling between the timer pump unit and after the retaining screws have been taken out the generator removed.

The generator drive gear on this model must be removed before the timing gear rear case can be taken off. This gear is retained by a castellated nut and keyed to the shaft. When the gear has been taken off the shaft the timer or ignition gear carrier unit may be unbolted from the timing gear case and taken off, together with the oil pump, after the necessary tubing has been disconnected.

The oil pumps on all models are gear pumps and should receive careful cleaning. The oil tubing should all be cleaned with wires and flushed with kerosene. The pump itself may be taken from the gear carrier unit and the latter unit disassembled by removing the caps and driving out the generator driving shaft bushings.

If the engine has to be taken from the chassis the exhaust manifold and carburetor or intake manifold should be unbolted from the block at this point. In replacing the carburetor or the intake manifold one should be sure that all joints are made tight, or the engine will not run satisfactorily. New gaskets should be used in every case.

At this stage of the overhaul the transmission cover, together with shift lever and emergency brake, should be removed and the front universal joint disconnected. The trans-

mission should then be supported upon a box or jacks and the cap screws fastening the bell housing to the engine removed. When this is done the transmission unit may be drawn back from the engine, carrying with it the clutch assembly.

Differences in Clutch Design.

On both the models 35A and 35B the driving clutch plates were carried upon three studs mounted on the flywheel, while on model 35C the driving plates were fitted with lips which engaged in splines in the flywheel. In either case, however, the clutch assembly may be drawn out with the transmission.

At this point the engine may be removed from the chassis if necessary and further disassembled. An illustration, accompanying this article, shows a lower view of the engine and the three main bearing retaining caps. The flywheel is retained by cap screws from the rear and by studs, and should be inspected carefully. Should the cap screws or studs show evidences of wear they should be replaced with new, for it is highly important that the flywheel be firmly fastened to the crankshaft.

The clutches on all three models are retained upon the clutch shaft, which is integral with the transmission driving gear by a large lock nut. The nut is kept from turning by a "cloverleaf" lock washer. After the lock nut has been removed the whole assembly may be pulled from the shaft with a wheel puller. Before removing the clutch assembly from the shaft the clutch release arm should be disconnected.

A large adjusting nut on the end of the clutch sleeve retains the thrust bearing in place and should next be removed. An iron Y rod may be used to compress the three clutch springs, using a short length of chain as a fulcrum. Remove the cotter pins in the clutch spring adjusting nuts, compress the springs and remove the nuts. The whole clutch assembly may then be pulled down. In assembling this unit much time will be saved if the driving discs are replaced with the projections (35C) or the holes (35A and 35B) in the discs in line.

In assembling the clutch the driving hub should be placed upon a flat surface and a driving disc placed upon it, then alternately, driven and driving discs until all 11 plates have been used. The sleeve should next be placed inside the pressure plate, taking care to have the two slots register with the projections on the plate, and this assembly put over the clutch. The springs and spring studs are next put into place, the springs compressed and the nuts placed on the studs. Each nut should be turned down until it is flush with the end of the stud, and final adjustment made after the clutch is assembled in the car.

Steering Gear.

The steering gear is of the well known worm and worm gear type and is fitted with two adjustments. This unit may be disassembled by removing the worm wheel cover and worm cover. Four adjustment points are provided in a worm wheel type of steering gear. Approximately only one-quarter of the teeth on the worm wheel are used in turning the car at right angles, so that under ordinary conditions but one-quarter of the teeth are worn at one time. As soon as one sector is worn the worm wheel should be turned a quarter revolution, and the steering arm changed to conform.

At the top of the Chalmers steering gear is an eccentric bushing, which is designed to carry the steering arm, upon which is mounted the worm, nearer to or farther away from the worm wheel. This bushing is kept in place by a set screw.

At the lower end of the steering column and beneath the steering gear housing is located a thrust bolt, which is designed to take all end play from the steering column.

Timing and Adjustments.

If the timing gears have been properly marked there will be no trouble in replacing them so that the timing of the camshaft will be correct. The flywheel is marked to show when the inlet valves should open, the marks being visible when the flywheel inspection hole cover is removed. To set the camshaft turn the flywheel over until the mark 1-6-IN-0 appears at the top of the circle. Then with the camshaft gear removed turn the camshaft in a counter clockwise direction until the inlet valve in number one cylinder just starts to open. This point may be determined by rocking

the camshaft back and forth with one hand on the push rod. The timing gear should then be put into place and fastened, being careful to check the timing with one of the other marks on the flywheel.

The ignition units of all models may be set after the gears have been meshed. Turn the engine over until the piston in number one cylinder has passed the top of its stroke, but has only just started on the down stroke. Retard the hand lever and remove the distributor cover, first having noted the position of number one spark plug terminal in the distributor head.

Remove the distributor brush and unlock the lock screw on the timer cam. Turn the cam until the breaker points begin to separate and it is possible to replace the distributor brush in position directly under the terminal leading to number one cylinder. Lock the cam and check the ignition with another cylinder. The firing order is 1, 4, 2, 6, 3, 5, and the distributor wires should be connected in this order. (No. one cylinder is next to the radiator.)

There are three points of adjustment on the models 35A and 35B carburetors. The first is marked "high speed," the second directly underneath the high speed, and the third on the intake side, directly back of the flange. The latter is termed the "low speed" adjustment.

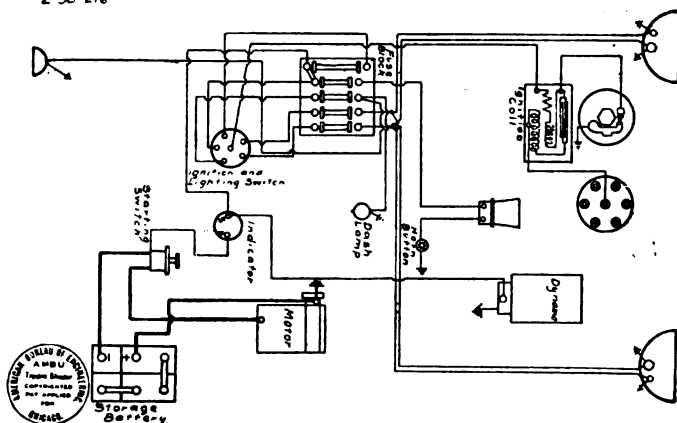
Before starting the engine and with the throttle wide open turn the second adjustment toward the air horn until as the throttle is closed and opened the roller lever passes the economizer notch, directly below the adjustment, without lifting the high speed adjusting needle, then back the adjustment three notches, giving the trial adjustment.

Start the engine and with the roller lever in the economizer notch, but not lifting the high speed valve, adjust the high speed nut for highest engine speed, being careful that the throttle does not move during the adjusting.

With the throttle closed adjust the low speed screw for smoothest idling at about 200 revolutions per minute. By quick acceleration and road tests the second adjustment may be altered to get the best results.

The carburetor on model 35C has practically the same ad-

WESTINGHOUSE Chalmers 1916 "35"
E 38-216



Wiring Diagram of Chalmers Car.

justments, though the general design is not quite the same. To make the adjustments on this carburetor proceed as follows:

Set the choke valve on the dash to the lean position and turn the economizer adjustment to the extreme right or counter-clockwise. Next turn the high speed adjustment down until there is no play in the inverted T lever arrangement, and continue to turn until two complete turns and one notch have been made.

Then turn the economizer adjustment to the left so that there will be about 1/64 of an inch clearance between the high speed sleeve and the inverted T lever. (About the thickness of a business card.)

Turn the low speed adjusting screw located just beneath the manifold flange until it seats and then back one full turn. As above, this adjustment should be changed, at the high speed screw until engine runs smoothly.

REO FOUR AND SIX

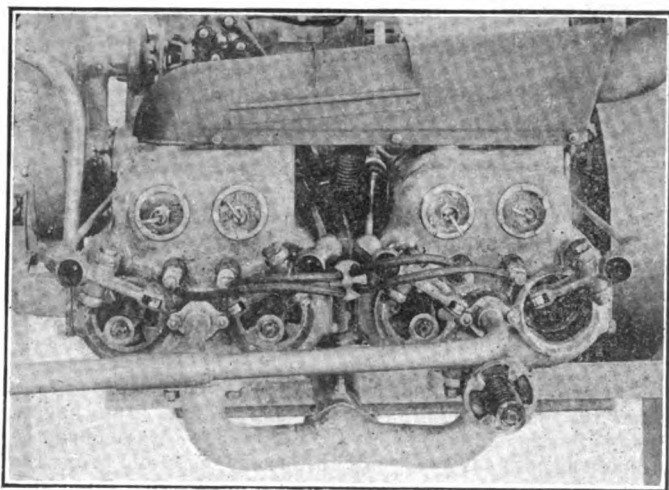
(For Practices of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

SINCE the year 1915 the mechanical construction of the Reo car has remained practically unchanged. The engine, of the L head type, differs from the conventional L head type in that the exhaust valves only are located in the L, the intake valves being located in the head and actuated by push rods and rocker arms. Here again the construction differs from the conventional, for the intake valves are mounted in the valve caps or cages and are removable without disassembling the engine.

The clutch, of the multiple disc type, is mounted in the flywheel separate from the transmission, which is mounted on the frame amidships. The rear axle of the four-cylinder cars is of the semi-floating type. Any of the units may be removed for repairs without disturbing the other units, a feature that makes the overhauling of the car a comparatively simple matter.

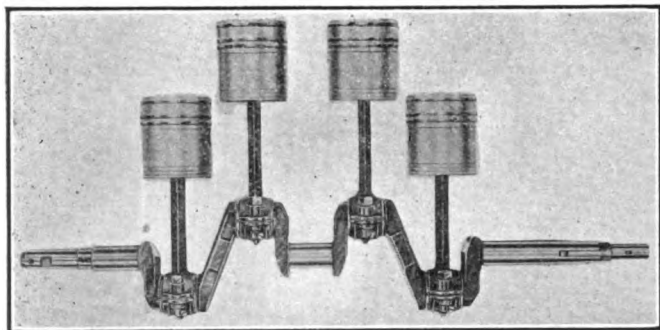
Draining and removal of the radiator is the first step in the overhaul. This unit is bolted to the chassis from beneath and connected with the engine through flexible hose at the top and bottom. Upon removing the hose clamps and the retaining bolts, it may be lifted from the frame.

The fan is mounted on an eccentric which is retained by a clamping bolt to the front water jacket cover. The water jacket cover is fastened by six cap screws, which should be removed, thus letting the fan with its cap be removed and giving access to the water jacket of the front cylinder block. A cover plate on the rear of the block and cover plates on the front and rear of the back cylinder blocks permit the insertion of cleaning wires for scraping off rust and deposits. The two cover plates between the blocks cannot be removed until one or both blocks have been removed from the crank case.



Top View of Engine Showing Rocker Arms Pushed to One Side and One Inlet Valve Cage Removed.

Four nuts fasten the water manifold to the cylinder blocks. These are next removed and after the tube leading to the intake manifold has been disconnected the manifold should be taken from the engine. The rocker arms are mounted on Y shaped castings, which are threaded and screwed into the cylinder blocks and prevented from turning by lock nuts. Loosen the lock nuts and swing the rocker arms to one side, leaving sufficient clearance for the removal of the in-



Piston and Crankshaft Assembly.

take valves and cages. Unless the Y castings, upon which the rocker arms are mounted, are broken or bent, these members need not be removed from the block. The rocker arms should be given a careful examination, and if loose upon the fulcrum bolt, either should be bushed or replaced with new.

The valve cages may be unscrewed with a pipe wrench or special tool, the latter method being the best. After the valve cages have been removed the springs may be compressed in a vise or between the jaws of clamps, the retaining pins pulled out and the valves removed. The valves are ground by placing the cage in a vise and turning the valve with a screw driver, using grinding compound in the usual way. After grinding, both the valve and cage should be thoroughly cleansed in kerosene oil. It is very essential that the valve stems fit the cages perfectly, or dilution of the mixture by air leakage will result. Where the valve stems do not fit either the valves or cages should be replaced with new.

A clamping bolt fastens the muffler pipe line to the exhaust manifold. This is next loosened, the exhaust line disconnected and the hot air stove surrounding the exhaust manifold taken off. The exhaust manifold is retained by six cap screws, three in each block, and when these are taken out the manifold may be removed.

The valve caps over the exhaust valves are next removed. This may be done with a special tool or with a bar of iron, if the priming cups are first removed. Exhaust springs and valves are removed in the usual manner and the valves ground. The exhaust valves are carried in removable bushings, and, while the renewal of the bushings is not wholly necessary in cases of slight wear, there should not be excess play between the valve stems and the bushings. In renewing bushings they may be driven out from the inside by means of an iron bar and hammer.

Examining the Tappet Assembly.

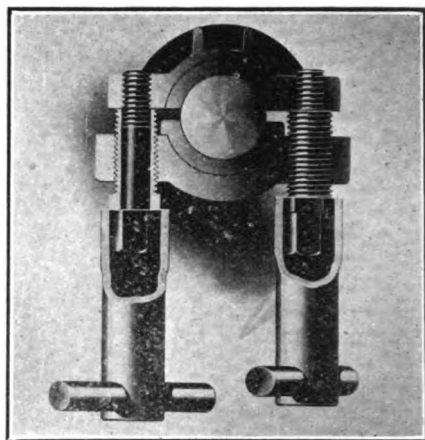
All of the tappets and bushing assemblies are retained in the crank case by means of clamps or saddles. If the overhauling operation is to extend as far as the removal of the camshaft, the tappet assembly should be removed and examined at this point.

On the left side of the crank case are located two cover inspection holes. These covers should now be removed and the connecting rods, crankshaft and camshaft examined. Upon this examination will depend the extent of the overhaul, for unless it is necessary to remove the pistons or connecting rods it will be unnecessary to remove the cylinder blocks.

To remove the cylinders remove the four nuts which fasten the intake manifold to the blocks and after having shut off the gasoline and drained the carburetor, remove the connections and take the carburetor and manifold from the engine. Below the carburetor manifold is located the water manifold. This unit, which is fastened to the two-cylinder blocks and the water pump, is next taken off and the cap screws removed that fasten the cylinder blocks to the crank case. The cylinder blocks may then be lifted from the crank case and examined.

With the cylinders removed the connecting rods and pistons may be removed if necessary for repairs or replacement. For ordinary connecting rod adjustment the removal of shims or the substitution of thinner shims is all that is necessary, unless the babbit shows signs of extreme wear, when the whole rod should be removed and either replaced with new or returned to the factory for rebabbiting.

All of the main bearings are adjustable from the outside. By referring to the accompanying illustration the construction of the main bearings is made clear. Instead of using shims for spacing the bearing caps, a patented sleeve and bolt arrangement is used. If there is play in any of the main bearings, loosen all of the adjusting screws and turn the inside or sleeve portions with the fingers until with the cap pressed against the journal they bring up against the upper bearing. Then turn the lower screw until the bearing cap is held solidly against the journal. Care should be observed not to make this adjustment too tight or excessive friction will result.



Sectional View of Main Bearing, Showing Method of Adjusting.

After having removed the two wires attached to the storage battery, the wiring attached to the engine and generator units should be tagged and removed. The four bolts fastening together the two portions of the universal flange should next be removed and after the engine retaining bolts have been taken out the engine may be lifted from the chassis. To facilitate the work the generator should next be unclamped, the generator coupling unbolted and the generator, with ignition unit, taken off.

Examination of the Pump.

The circulating pump body should next be taken off. This casting is fastened by seven nuts on studs from the rear. When the body has been removed the impellor is exposed and after removing the nut on the end of the shaft the impellor, which is keyed to the shaft, may be pulled off with a wheel puller. The pump cover, which is retained by two nuts, should next be slipped off. In order that this may be accomplished more easily it is a good plan to loosen the stuffing box nut. The starting ratchet, which is pinned to the crankshaft and the fan drive pulley, which is clamped to the shaft, should next be removed and the front timing gear case cover removed. The pump drive gear should next be pulled from the shaft and the shaft examined for wear. Excessive play in the pump shaft should be compensated for, either by the removal of the shaft or the bushing. Unless there is wear at this point it will be unnecessary to remove the shaft or coupling.

To remove the pump shaft, unscrew the nut on the end which retains the generator drive flange and after having driven out the pin holding the flange to the shaft remove the flange and friction disc. The shaft may then be removed from the front and the shaft bushing driven out toward the front.

Practically all of the repairs to the oil pump may be made by the removal of the cap at the bottom and outside the crank case, or by taking out the plunger. This member is fastened to the eccentric by a pin which is retained in place by a cotter pin. After the cotter pin and eccentric pin have been removed the plunger may be freed from the eccentric and removed.

Disassembly of the Clutch.

By inserting an iron Y bar between the engine and flywheel and hooking a heavy piece of wire around the flywheel to serve as a fulcrum, the heavy clutch springs may be compressed and the retaining nuts removed. This will permit the taking out of the spring bolts and the removal of the clutch cover, or so-called thrust member, together with the clutch plates and roller bearings. With the clutch out of the way the large nut on the end of the crankshaft should be taken off and the flywheel pulled from the shaft. Unless absolutely necessary the hub should not be unbolted from the

flywheel. The holding bolts should be examined, however, and made tight if necessary.

The first and second camshaft bearings are retained by set screws, while the third or last is retained to the end of the crank case by cap screws. This last bearing need not be disturbed unless it shows evidences of wear. The other two must be removed before the shaft can be taken from the engine. Both the timing gears are driven on to their respective shafts and kept from turning by keys. Unless they show signs of wear or are loose on the shafts they need not be removed.

If it is necessary to remove the crankshaft the timing gear must be pulled off, then the rear bearing housing unfastened from the crank case and removed. After the main bearing caps have been removed the crankshaft may be taken from the rear of the crank case.

All of the oil tubing should receive a thorough cleaning. The oil tube leading from the timing gear case to the rear main bearing may be cleaned by means of a long, stiff iron wire.

Reassembly of the Clutch.

With the removal of the clutch, as directed in this article, the disassembly is practically complete. In reassembling this unit a fabric covered driving disc should be the first to be placed in the flywheel, then a driven disc and the balance of the discs alternated. To remove this unit without disturbing either the transmission or engine is an easy matter. The two universal joint flanges are first disassembled and the short length of shaft between the joints removed. The clutch unit may then be removed by compressing the springs, as before directed, removing the retaining bolts and pulling out the clutch members.

After the universal joint at the back of the transmission has been uncoupled and the control rods disconnected, the change gear cover or transmission cover should be removed. The transmission should then be disconnected from the frame and lifted from the chassis.

Four screws fasten the starter ratchet to the clutch universal. When these are taken out the ratchet and starting sprocket may be taken off. The pin which retains the rear universal member to the driving shaft should next be taken and the member pulled from the shaft. After the set screw has been removed the rear roller bearing may be driven from the case. The front set screw is next removed and the front bearing driven into the case, permitting the removal of the drive gear. The front universal member is pinned and keyed to the drive gear shaft.

The jack shaft may be removed after the two plug adjusting nuts have been taken out of the housing. These plugs may be removed with a bar of iron. In replacing the assembly the jackshaft should be put into place first, then the drive gear and main shaft with the sliding gears. The jackshaft should then be adjusted endwise so that the drive and driven gears mesh the whole length of their faces. All end play may be compensated by proper adjustment of the plugs at the ends of the jackshaft.

Rear Axle Assembly.

The rear axle is of the semi, or half floating type, and the complete axle with housings must be removed from the car for a complete overhaul. After having disconnected the brake rods and torque rod from the rear axle housing, remove the assembly from the car, taking care to have the car properly supported by jacks or horses.

The manufacturer advises the owner to call upon his regular dealer for expert adjustment of the rear axle differential, which requires considerable experience.

The front wheels are of the standard roller bearing type and retained by lock nuts and washers. As stated in the drive shaft and pinion gear adjustment directions, care must be exercised in replacing roller bearings not to make too tight an adjustment.

But one adjustment is necessary or provided for the steering gear, and that a roller contact stud in back of the sector. The sector should be near enough to the steering shaft pinion so that there is but little lost motion. An excessive amount of play between the wheel and the steering arm is evidence of looseness at the wheel, gear or sector, and should be compensated by the replacement of necessary keys or parts.

Timing and Adjustments.

The flywheel has upon its face three sets of markings: U. D. C. 1 and 4; U. D. C. 2 and 3 and E. C.; meaning upper dead center of one and four pistons; upper dead center of two and three pistons, and exhaust valve closes. With the mark U. D. C. 1 and 4 at the extreme top and on a center line with the cylinders, the pistons in one and four cylinders are at the extreme top of their stroke.

To set the valves, if the camshaft timing gear has been removed from the camshaft, the flywheel should be turned until the mark E. C. is at the top and on the center line with the cylinders. The camshaft should then be turned in a counter clockwise direction until the exhaust valve in either of the cylinders just closes. The camshaft gear may then be meshed and fastened to the shaft. Because of the fact that four screws are used in fastening the gear to the shaft flange, at least one point may be found where the teeth may be meshed. Not more than one-half an inch each side of the mark E. C. is permissible, since this is the latitude allowed for adjustment.

All of the tappets and valve stems should have a clearance between them of not more than .004 or the valves will be noisy. This adjustment should be carefully inspected after the engine has been properly timed.

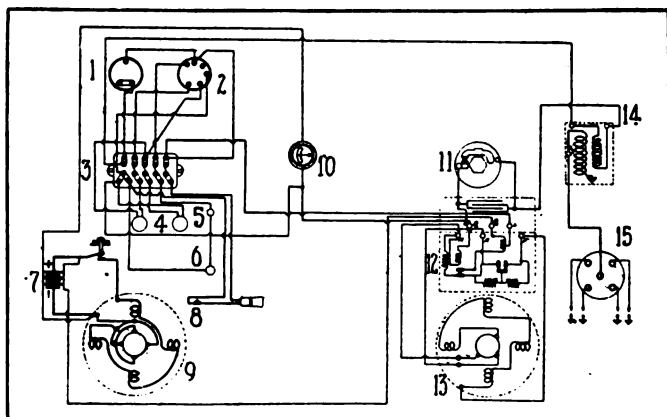
The two carburetor adjustments are a needle valve, located beneath the bowl, and a slow speed adjusting screw, located on the body just below the flange and slightly below the throttle valve.

First see that the carburetor adjustment on the switch bracket is turned to the run position, and that this adjustment gives full travel to the carburetor choke lever on the carburetor, the choke lever being at the front end of the slot with the control lever in the run position. Then turn off the needle valve until it seats, also turn the slow speed screw until it is also seated.

The needle valve should next be opened one and one-half turns and the engine started. After the engine has heated to normal operating temperature, suddenly open the throttle two or three notches. Should the engine back fire, open the needle valve until it does not back fire upon sudden acceleration. If it does not back fire close the needle valve until it does, then open it slowly until the back firing is stopped. The idea being to obtain just enough fuel to prevent back firing, but not an excessive amount.

The engine should then be throttled down and the spark retarded. By slowly opening the low speed adjustment a point will be found where the engine will run idle smoothly with the throttle fully closed.

If the starting motor fails to start, look for some loose connection or poor contact. If the battery is run down it can be easily ascertained by turning on the lights. If they burn very dim it shows that the battery is down.



1, Ignition Switch; 2, Lighting Switch; 3, Fuse Block; 4, Headlights; 5, 6, Dash and Tail Lights; 7, Battery; 8, Horn Button; 9, Starting Motor; 10, Ammeter; 11, Breaker Box; 12, Cut Out and Regulator; 13, Generator; 14, Ignition Coil; 15, Distributor.

STUDEBAKER FOUR AND SIX

(For Practices of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

THE construction of the Studebaker engine has been changed somewhat, when those now in active service are to be considered, although the general design of the transmission gearset and rear axle has remained practically the same for some time.

Both the four and six-cylinder engines of the series 16, 17 and 18 are of the L head type, and the cylinder heads are not removable, being cast in block with cylinders. The valves may be ground and the carbon removed from the pistons and explosion chambers without disassembling the engine.

If the overhaul is to be complete the radiator should be removed from the car so as to render the engine more accessible. The horn should next be removed and placed to one side, leaving the wire connected to it. Disconnect all of the secondary wires at the spark plugs and mark them with tags so that they may be replaced. The secondary clips having been removed, slip off the distributor head and disconnect the wire leading from the distributor to the coil. The secondary wire assembly may then be removed from the car.

After the water hose connections have been uncoupled the nuts on the top of the water header should be unscrewed and the water header, which forms the top of the engine, lifted off. This will expose the interior of the water jacket. With a stiff wire or scraper loosen and take out all of the old scale and deposits from the jacket.

The studs which fasten the water header to the block are screwed into plugs, which in turn are screwed into the cylinder heads. These plugs may be removed with a wrench, leaving a large hole, through which may be inserted scrapers for removing the carbon deposits in the cylinders. A point that should be noted is the length of the studs, the longest being at the front, ranging to the shortest, which is at the rear. When the plugs are replaced they should be coated liberally with white lead to prevent water leakage into the cylinders.

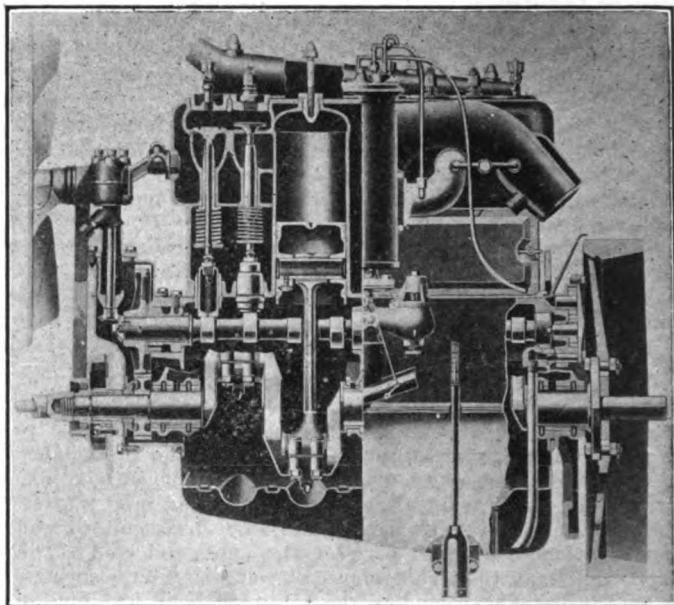
The next step is to remove the valve caps, for which a special hexagonal shaped wrench is necessary. When these are removed the valve chambers are exposed and through these holes the balance of the carbon may be scraped from the pistons and explosion chamber. When carbon is scraped from the cylinders in this way the piston in the cylinder upon which the work is being done should be at or near the top of its stroke. Unless this point is observed there will be danger of scratching or scraping the cylinder walls.

Inspection of Fuel System.

Turn off the gasoline at the tank and drain the fuel from the system at the carburetor, then disconnect the fuel line at the carburetor. The vacuum tube leading from the intake manifold to the vacuum tank should next be disconnected, as well as the carburetor control rods.

The intake manifold of the four-cylinder engine is held in place by two yokes, which also serve to clamp down the exhaust manifold. The intake manifold of the six-cylinder engine is clamped in the same way, but is also fastened to the block by two cap screws at the middle inlet passage.

In addition to the clamping yokes the exhaust manifold of



Cross Sectional Cut of Engine, Showing Oiling System and Timing Gears.

the four is bolted to the cylinder block between the exhaust ports of the second and third cylinders while the six is fitted with two studs, one between the second and third, the other between the fourth and fifth cylinder ports. When these studs and yokes have been taken off the two manifolds may be taken from the engine.

The valve cover plates are held in place by three wing nuts. The covers should next be removed and the valve springs lifted by means of a Y iron or valve lifter, the pins taken out and the caps and springs removed.

When this type of engine is being overhauled it is convenient to leave all valves in their respective places, removing them only as they are being ground. This obviates the necessity of marking them.

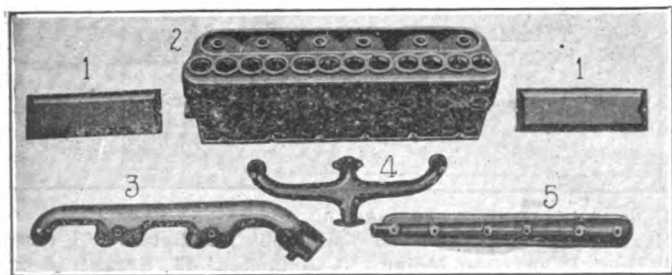
After the oil has been drained from the system, the oil pan, which is bolted to the lower part of the crank case, should be removed and given a careful cleaning with kerosene and a scrubbing brush. When the pan is removed the crankshaft, camshaft, connecting rods and oiling system are exposed. If the bearing is broken, or badly worn, it may be removed through the lower part of the cylinders and crank case after the crankshaft has been turned to the right position.

The caps and babbitts of the main bearings may be replaced with new ones, or repaired if necessary, but to renew the upper or inner part it will be necessary to remove the engine from the chassis.

The generator wires should next be disconnected and tagged, as well as the wires leading from both the coil and starting motor to the junction box and the junction box removed. The generator is held into place by three cap screws in the crank case and one on the cylinder block. These should be removed and the generator lifted from its place. The fan bracket, which is held in place by one bolt, should then be removed, leaving the engine block free.

The cap screws, which fasten the cylinder block to the crank case, are next removed and the cylinder block lifted from the crank case. With the cylinder block removed the valve tappets and guides may be taken from their places and repaired or replaced with new ones.

The next step in disassembling is the removal of the hand starting crank ratchet. This ratchet is fastened to the crankshaft with a left hand thread and may be removed with a wrench, turning toward the left, while the flywheel is being



1, Valve Dust Cover; 2, Cylinder Block; 3, Exhaust Manifold; 4, Intake Manifold; 5, Water Header.

held by an assistant. When this ratchet is removed the starting clutch is exposed. The starting clutch unit is keyed to the shaft and may be removed with a wheel puller. First, however, the starting motor and chain must be taken off.

Handling the Starting Motor.

For tightening up the chain the starting motor is hung upon a hinge device, which allows it to swing in a small arc. The lower end of the motor mounting casting is fastened by a cap screw. The cap screw should be loosened, allowing the motor to swing, then the chain removed. The hinge bar is a piece of steel rod, held in place by a cotter pin. Remove the cotter pin, drive out the bar and the starting motor may be taken from the engine. The starting clutch unit may then be pulled from the crankshaft.

The screws which fasten the distributor, as well as those fastening the ignition coil to the engine, should next be taken out, and these units removed. The bolts holding the water pump outside housing are next removed and the cover taken off, exposing the water pump blades.

The timing gear case cover is next removed, exposing the timing gears. Should any of the timing or distributor gears be worn they may be removed at this time, though it is not necessary to remove them to complete the disassembling of the engine.

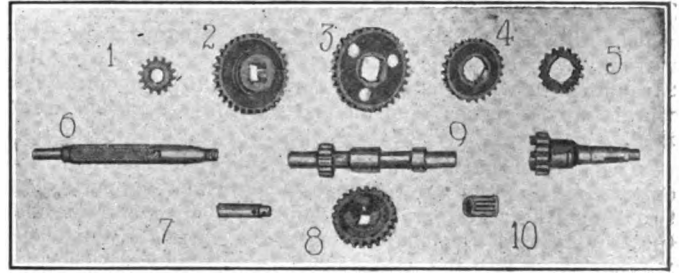
The front bearing of the camshaft is held into place by a set screw. When this screw has been removed the camshaft may be driven from the engine by using a bar of wood or soft iron.

In the later models the engine may be removed from the chassis without first removing the flywheel. Engines of the older models, however, require the removal of the flywheel before they can be taken out of the chassis.

For convenience, it is best to draw the rear axle and transmission unit back a few inches before the flywheel and clutch assembly is removed. Disconnect all of the brake rods and gear controls from the transmission and after removing the cotter pins disassemble the universal joint. After the universal joint has been disassembled remove the grease or oil cup from the clutch hub, and with the pedal pressed down as far as possible in the oil cup hole, insert a heavy nail or machine screw. When this is done the clutch spring will be held compressed. The nail should be left in place until the car is reassembled, or it will be an extremely difficult matter to recompress the clutch spring.

Between the yoke arms forming the universal joint will be found a nut, which is screwed to the crankshaft. This nut is next removed, allowing the clutch drum to be removed from the car. Four bolts fasten the flywheel to the crankshaft and when these are removed the flywheel may be taken from the car. The flywheel and clutch assembly may be removed with the engine on the series 18 model. On this model, after the universal joint has been disconnected and the pin put in the clutch to hold the spring under compression, the engine and clutch assembly may be removed.

The engine is held in the frame at four points, two in front and two in the rear. Remove these four bolts and the



Transmission Gearset Parts: 1, Reverse Idler Gear; 2, Low and Reverse Sliding Gear; 3, Countershaft Gear; 4, Countershaft Intermediate Gear; 5, Countershaft Low Speed Gear; 6, Transmission Main Shaft; 7, Reverse Idler Gear Pin; 8, High and Intermediate Sliding Gear; 9, Countershaft; 10, Transmission Shaft Front End Bearing with Main Drive Pinion.

engine may be lifted forward and out of the frame. With the engine removed, the crankshaft with the timing gear may be taken out, if it is found necessary to replace the main bearings.

The oil pump is fastened to the rear of the crank case and should be removed and cleaned. All of the oil piping should be flushed with kerosene and the foreign matter forced out by means of a stiff wire. When the pump is put into place and the engine reassembled the priming plug should be removed and the pump filled with oil. If this is not done there is danger of the engine running dry, since a gear pump sometimes fails unless it is running in oil, particularly if the gears have been wiped clean.

As will be seen in the illustration, the clutch unit consists of the drum, which is bolted between the two body parts, which contains the heavy spring and the ball thrust bearing. Unless it is unavoidable this unit should not be disassembled because of the difficulty in compressing the spring.

Although it is not necessary to remove the transmission and rear axle assembly from the car for disassembling, it is more convenient to do so. When the nuts which fasten the transmission gearset to the rear axle have been removed the gear case may be drawn from the axle, bringing with it the pinion gear and propeller shaft assembly.

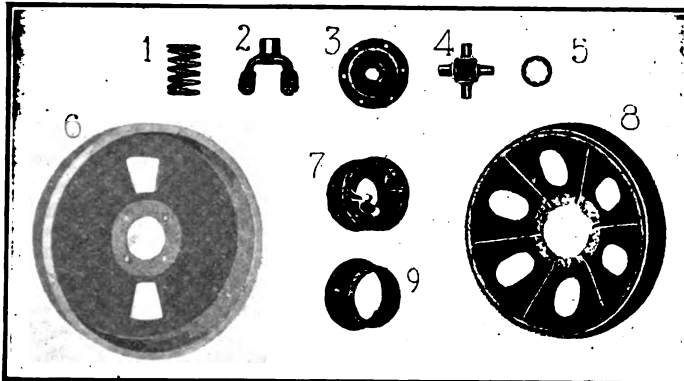
There are two universal joints, one at the front, the other at the rear of the propeller shaft. The rear joint is enclosed in a boot, which is fastened to the housing and to the propeller shaft by clamps. These clamps are removed and the boot slipped back upon the shaft, exposing the rear joint, which may be slipped apart. It is essential that both universal joints be in good condition. Should there be the slightest lost motion or signs of wear, the worn parts should be replaced with new parts or knocks that might be difficult to locate will result. The rear universal joint body is both keyed and held to the gearset main shaft by a nut, which should be removed and the joint body pulled from the shaft. The bevel pinion gear on the opposite side of the gearset is fastened in a similar manner and should also be removed.

After the rear universal joint has been removed the eight screws which hold the transmission front cover in place should be taken out and the cover with bearing taken off, exposing the interior of the gearset. The top cover should be removed next to facilitate the work.

Operations in the Gearset Interior.

The front roller bearing outer race is clamped into place by a bolt, which passes through the flange. When the bolt is removed the race may be drawn from the case for examination. After the transmission gearset covers have been removed, both the main shaft with all gears and the countershaft may be removed. The rear bearing race is held in place by a set screw and when the screw is removed the race may be driven from the case.

The rear axle is of the full floating type, therefore it is unnecessary to disassemble the housing. The first step in the disassembling of this unit is the removal of the differential cover plate. Next the nuts on the wheel flanges are removed. When this is done the shafts may be withdrawn from the axle. After the shafts are removed, inside of the



1, Clutch Engaging Spring; 2, Front Universal Joint Yoke; 3, Clutch Cone Hub; 4, Front Universal Joint Cross; 5, Clutch Thrust Ball Bearing; 6, Flywheel; 7, Clutch Hub; 8, Clutch Cone; 9, Front Universal Joint Front Housing.

wheels will be found a large lock nut, which is kept from turning by means of a washer having a bent over lug. Straighten this bent edge and turn off the large nut. The wheels may then be taken off and the roller bearings examined.

The differential is mounted upon two roller bearings, the outer races of which are mounted in two clamp supports. The two supports are integral with studs, which extend through the front part of the housing and serve to fasten the transmission gearset to the axle. Since these nuts have been removed in taking off the gear case, the supports with the differential may be pulled from the axle through the hand hole at the rear.

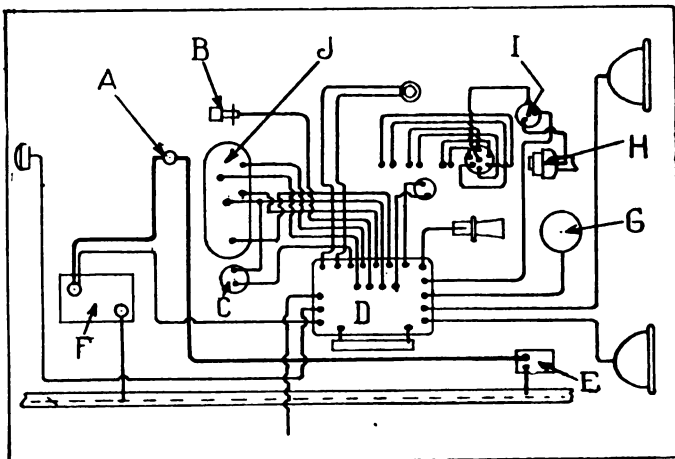
The steering gear is of the worm and wheel type. To disassemble it, first remove the four screws holding the worm wheel cover in place and remove this cover. After the steering ball arm has been unclamped and removed the worm wheel may be drawn from the housing. At the top of the steering gear case is a clamping bolt. This bolt should be loosened and the worm adjusting nut removed, thus allowing the worm and bearings to be withdrawn and the steering gear disassembled.

Timing and Adjustments.

As a general rule the timing gears are marked so that they may be set correctly. If they are not marked they may be set as follows: Turn the crankshaft with the hand crank until the flywheel marking UP-D-C-I is beneath the arrow. Then turn it forward five degrees. Next turn the camshaft counter clockwise until the intake valve in No. 1 cylinder is just opening. Then drive on the timing gear and mesh the gears. This setting can be checked by marks upon the flywheel, which indicate the opening and closing of all of the valves.

To set the spark the spark control lever should be set to extreme advanced position and the piston in No. 1 cylinder brought to the beginning of the compression stroke. The beginning of the compression stroke may be detected by holding the thumb over the open petcock until compression is felt. The upper dead center position is indicated by the mark UP-D-C-I on the flywheel coming under the pointer at the top of the flywheel. Turn the crank until this mark has four inches to travel (for the four-cylinder engine) or 5½ inches (for the six).

Remove the distributor cover without disconnecting the wires, lift off the distributing segment holder and loosen the nut which holds the cam on the tapered shaft. After the cam has been pried from its seat turn it in a counter clockwise direction until it reaches a position such that when all



Wiring Diagram: A, Starting Switch; B, Speedometer Lamp; C, Current Indicator; D, Junction Block; E, Starter; F, Battery; G, Generator; H, Distributor; I, Coil; J, Lighting Switch.

parts are replaced the edge of the distributing segment will come directly under No. 1 distributor terminal. Then continue to turn the cam until the breaker points start to separate. Tighten the lock nut so as to hold the cam in this position and replace the distributing segment and cover. Check over the timing by removing the center wire from the distributor cover and holding it about ¼ inch from the engine block. A spark should be formed when the upper dead center mark has the distances to travel as given above.

Adjustment of the Carburetor.

The carburetor adjustment is as follows:

Retard both the spark and throttle levers and turn the auxiliary air valve (the large adjusting nut) to the right as far down as possible; then turn it back, or to the left, 1½ turns.

Now turn the high speed adjustment, which is located directly beneath the auxiliary air valve to the right, or as far up as it will go. With the adjustments in this position start the engine.

Next turn the auxiliary air adjustment either to the right or to the left (usually toward the left), until the engine fires upon all cylinders. This finishes the low throttle adjustment.

With the spark retarded, accelerate the engine and note whether it back fires. If it does not turn the high speed adjustment to the left or down by half turns until the engine does back fire upon quick acceleration. Then turn it to the right or up, slowly, until the engine accelerates smoothly without back firing.

PAIGE

(For Practices of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

THIS article deals with the Paige six-cylinder, model 6-55, giving instructions for overhauling that type. These instructions are also applicable in general repair work on all models of the Paige of the past several years, which are similar in general mechanical detail.

Disassembling and Reassembling Engine.

The oil is drained from the crank case and the crank case removed and cleaned with kerosene and a stiff brush. In replacing the crank case shellac the gasket either on the crankcase side or the cylinder block side, but not to both. Fill the oil troughs, as this will insure the cranks getting oil upon their first turn. Do not fully tighten any one bolt until they are all drawn tight. All parts should be carefully lubricated. All nuts and bolts are to be thoroughly and evenly tightened. All cotter keys and pins are properly bent to insure against accidental loss.

The valves are enclosed and become accessible by removing the screws on the cover plate, two plates with two screws each. Removal of these plates will expose the valves, valve springs, retainers and adjusting screws. Adjustment

on this type of valve tappets is known as the "screw adjustment."

Remove the plugs in the cylinder head, the valve chamber and on the valves and pistons. This will allow the valve spring retainers to be removed by releasing the tension on the springs, after which the valves can be lifted out.

On the late models the automatic valve rotator is standard equipment and this device is very valuable in assisting the valves to keep clean and doing away with readjustment or grinding. It can be purchased from any Paige dealer and is installed as follows: Assemble the valve, valve spring retainer and spring retaining washer. Hold the spring retainer between the thumb and finger of one hand, then spin the valve with the other. If the valve spins freely it is ready to assemble to the engine in the regular way. If the valve does not spin freely find where the binding action occurs. This may be a burr or a sharp edge on the retaining washer, or perhaps a tight fit in the valve stem groove. Overcome this by taking an oil stone and relieving the sharp edges or high spot so that the valve will turn easily. Put this assem-

bly back into the engine in the regular way and adjust the tappets so that there is from .003 inch to .005 inch clearance between the end of the valve stem and the top of the adjusting screw. After this is done raise the valve and place the automatic valve rotator in place. In adjusting this device the engine is turned over until the valve is seated, holding the locking nut with one hand and adjusting the thumb screw with the other. It should be so adjusted that there is no end play between the retaining washer and the tappet adjusting screw. Should the valve not be able to be reached with the fingers conveniently, the adjustment can be made by holding the locking clamp with a file that has the end turned up to right angles. Perfect results can be obtained from these methods.

Pistons.

The correct amount of clearance between the piston and cylinder is .001 inch to each inch of the bore, using .002 inch over this measurement as a high limit. A piston with this clearance should not slap or pass oil.

In a great many instances pistons have been taken out for passing oil or for slaps when the condition of the piston shows no apparent reason for removal, the piston showing perfect bearing surfaces well polished. It is, therefore, necessary to change only the one causing the slap and not all of them.

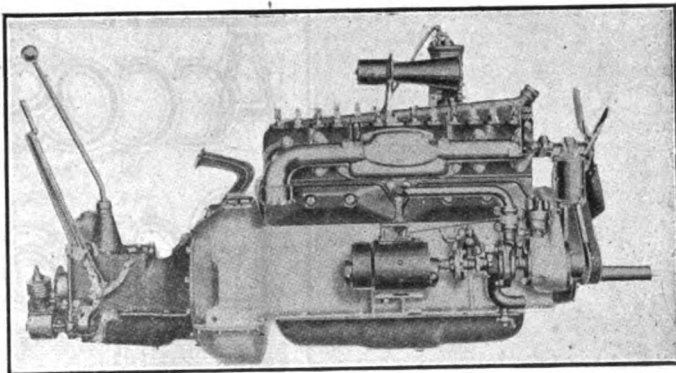
In fitting the rings when new ones are replaced care should be taken that they fit snugly in the grooves, but do not bind or stick. When using a grinding compound upon the pistons, in case lapping is necessary, great care should be exercised that every minute particle is removed.

Wristpin knocks should be considered as to whether the bushing or pin is causing the knock before it is changed.

Inspection of the Timing Gears.

In order to remove the timing gears the engine must first be unbolted from the chassis and then jacked up far enough so that the gear housing clears the cross member of the chassis. Remove the fan pulley and then the gear housing cover can be taken off. Turn the engine over until the marked teeth on the crank and cam gears come directly in line, and when these are in line proper the removal of four screws and the dowel pin will release the cam gear so that it will easily slide out of position.

The crank gear is held in place by a Woodruff key and the starting crank nut. The pump gear is held with a Woodruff key. The removal of these keys will allow the taking off



Right Side of Paige Engine.

of the gears. When reassembling be careful to get the punch marks on the crank and cam gears directly in line. This will insure proper timing, provided the crankshaft position has not been changed. Examine all the gear teeth for wear. A worn timing gear is productive of much noise, as well as causing the time or opening of the valves to vary. It is obvious that the gears should be well fastened to the shaft to avoid noise or irregular operation.

The clutch is of the dry plate type and is encased together with the flywheel by a bell housing in unit with the transmission case. (See power plant overhaul.)

Removing Distributor and Generator.

Remove the two cap screws that hold the front bracket on the pump to the gear case, taking off the Remy distributor shaft and housing by loosening locating screw and lifting the distributor assembly from the gear housing, after which the complete assembly and gears can be removed from the gear housing. This assembly can be returned in any position as the distributor is timed by the location of the distributor drive gears. All end thrust is taken up in the pump shaft by a ball bearing located in the front end of the gear housing. Examine carefully for worn parts and tighten after cleansing.

Remove the dust tight cover around the commutator end of the generator and note the condition of the brushes. The commutator wears naturally to a brownish color in normal use, but if it should appear black or scored, the surface must be smoothed with a piece of fine No. 00 sandpaper. Never use emery cloth, as the particles from this material would cause serious damage should they lodge in the pores or segments of the copper. Blow out all the remaining dust and note that the brushes swing freely on their pivots and that the spring tension is sufficient to give them good contact with the commutator. Should the brushes need replacing they may be obtained from the Remy factory, but never use cheap, inferior types of brushes, as this will later develop more trouble to this assembly.

In cleaning the thermostat care should be taken not to spring the thermostat blade in any way, as its accuracy will be destroyed should the contacts be pried apart.

The bearings of the dynamo must be lubricated regularly to give satisfactory service. The dynamo runs at a high rate of speed and in case these bearings are not regularly lubricated it will become necessary to replace them. This should be handled by a garage repair man.

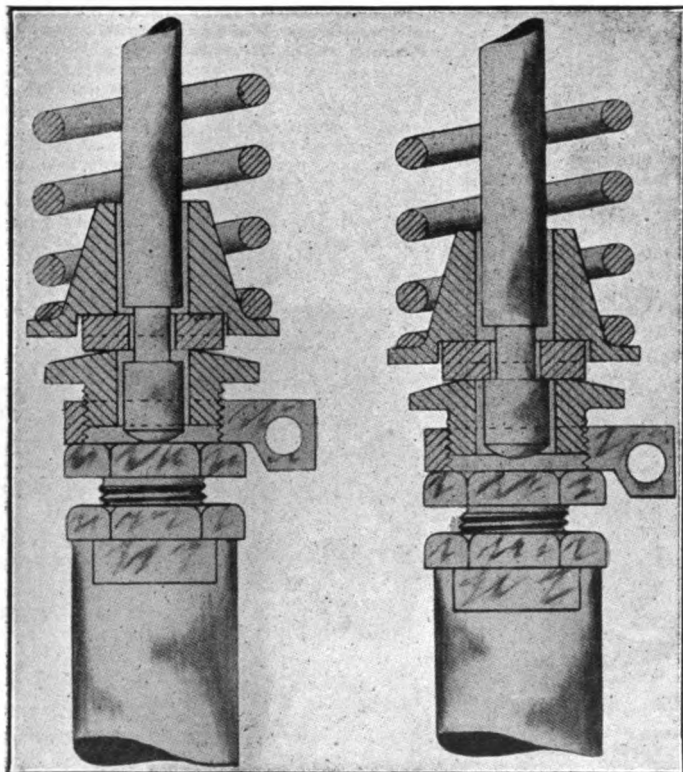
Adjusting Rayfield Carburetor.

The Rayfield model "M" carburetor is used and should this assembly need repair parts they can be obtained by ordering from a branch or agency of the Findelsen & Kropf Manufacturing Co., who have stations in every city.

There are two adjustments only, one for high and intermediate speeds and one for low speeds. When these adjustments are set they lock automatically and cannot change. When adjusting the carburetor be sure and have the dash control plunger down.

The low speed adjustment is turned to the right or left as required until the engine runs smoothly and evenly at low speed. If the engine does not throttle low enough turn the stop screw arm to the left until the engine will run at the lowest number of revolutions possible.

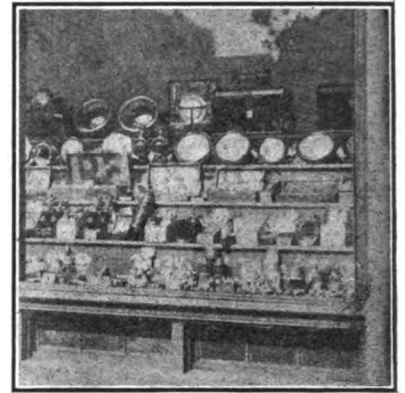
(Continued on Page 75.)



Cutaway View of the Automatic Valve Rotator.

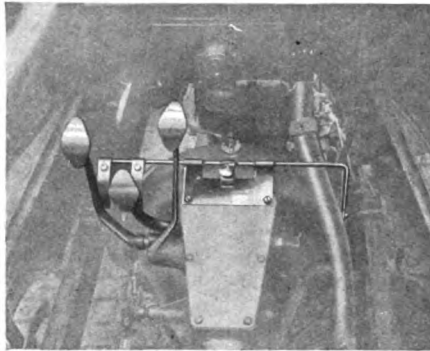


Accessories Department



The Speederator combines a foot accelerator with an automatic controlled advance and retard for speed changing on the Ford car. It eliminates the necessity of any and all hand operation of the steering post throttle and automatically idles the engine in changing speed. When low or reverse clutches are engaged the engine is supplied with more gas automatically and speeded up. As soon as these clutches are disengaged the gas is automatically cut off, preventing the racing of the engine, and making the change from low to high, which is so difficult for amateurs, an easy matter. In addition to the automatic feature is provided a foot throttle or accelerator, which renders driving convenient and identical with high priced car methods of control.

Manufactured by the Versal Products Manufacturing Co., Detroit, Mich. Price, \$4.85.



The Speederator Applied.

The Leb-Iron Traffic Sign is so constructed that it will withstand a large amount of hard usage. It is provided with a seven-inch red or green globe, as shown in cut, with an electrical lamp socket and wire connections already for use. It may be connected beneath the pavement or from overhead, and is sufficiently prominent to cause any car driver to take immediate notice of it. It is approximately six feet in height and the letters are raised one-half inch above the background and covered with white enamel, the background with red or green smalts. The rest of the sign is finished in black enamel.

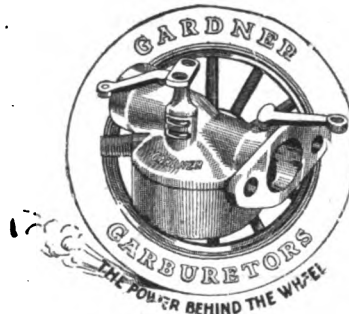
Manufactured by the Lebanon Machine Co., Lebanon, N. H. Price with electric light and globe, \$20; plain provision being made for attaching lantern, \$16.

The A. C. Carbon Proof Spark Plug is a new type of this famous make of plugs and a sectional view is reproduced herewith. This plug was designed primarily to overcome the carbonizing trouble experienced in a certain tractor engine using kerosene as a fuel. The results were so satisfactory that it was decided to put the plug on the market for use in automobile engines. It is made in sizes for the Ford, Overland and Studebaker cars, and in tests on Ford cars covering a period of one year the manufacturers claim that no instance has been found where a plug was removed on account of carbonizing. The porcelain is provided with a number of ribs, having saw tooth edges which attain a sufficiently high degree of heat to burn away the carbon, thereby keeping the edges free from deposits and eliminating any chances of possible short circuit.

Manufactured by the Champion Ignition Co., Flint, Mich. Write for prices.

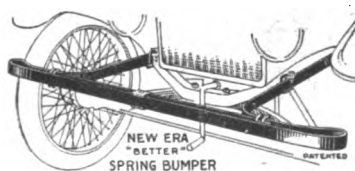


The A. C. Carbon Proof Spark Plug.



New Era "Better" Spring Bumpers are light, strong and neat. They are made of $1\frac{1}{2}$ x 5/16 inch spring steel, and the construction is such that bumpers made of this size have greater resisting power and absorbing qualities than bumpers of other construction made of steel wider and thicker. The construction is double front bar full length with center tie, giving maximum strength from end to end. When an angle blow is received the vibration is distributed and absorbed throughout the entire length of the bumper and attaching arms.

Manufactured by the New Era Spring and Specialty Co., 1177 Hamilton Ave., Grand Rapids, Mich. Write for prices and literature.



New Era "Better" Spring Bumper.

The Gardner Thermostat Carburetor is automatically adjusted to either heat or cold. The makers claim it to scientifically and automatically maintain the correct proportion of air and fuel to suit the varying speed or load of the motor. It is free from moving parts and thermostatically regulated, giving more gasoline to start and automatically cutting off the gas as the engine warms up. This thermostat is submerged in the gasoline and its action is controlled by its temperature and varies as the changes of temperature require.

Manufactured by the Gardner Carburetor and Brass Works, Summit Ave. and Wabash R. R., Detroit, Mich.



Leb-Iron Traffic Sign.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

The Smith Auto Signal, manufactured by the Smith Signal Corporation, 53-55 West 66th street, New York City, is a most practical and efficient safety device to meet the dangers presented by congested traffic. The Signal is placed on the left rear fender or mudguard (or panel or body in the case of commercial vehicles and trucks) by an adjustable nickel plated flange. Four nickel knobs are furnished instead of joint and flange where owner prefers. This Signal shows left, right or stop two sides, i. e., both the front and to the rear. The left rear fender is the logical place for the Signal as it is seen by all cars following from the rear, or cars approaching from the front, as well as by the traffic policeman, who is always to the left of cars approaching him. This Signal shows both day and night, and is just as necessary for driving outside of the cities as in cities.

Operates for left, right or stop only at the will of the driver, from a single handle, three-way switch attached to the steering shaft at the tip of the fingers or any place most accessible to the person driving. Indicates what you intend to do before you do it. Buzzer in the switch-tell-tale that Signal is performing its function. Signals through red ruby glass 5x6 inches. Individual illumination of the three words left, right, or stop by 6-8 volt, 10 candle power bulbs. Simply constructed, no moving parts to get out of order. Easily attached, directions with every Signal. Each Signal complete with switch, buzzer enclosed in switch, sufficient weatherproof wire, tape and staples. Packed in individual carton ready for shipping.

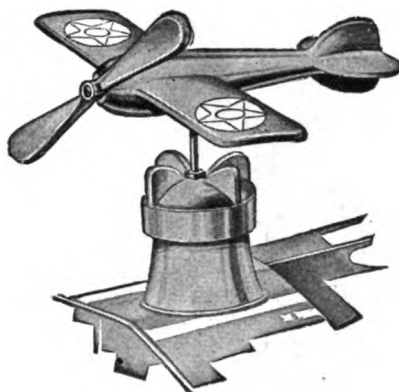
Distributed in United States by Weiss & Sinclair, 53-55 West 66th St., New York City. Write for literature and prices.

"The Liberty Plane" is both one of the latest and most attractive radiator ornaments and is new and original. It suggests patriotism in a manner that is easily recognized, pleasing, yet different. It is an exact miniature of the aeroplane, cast in aluminum, highly polished and decorated with the flying emblem in red, white and blue enamel on each wing. It will not wear out and is weatherproof.

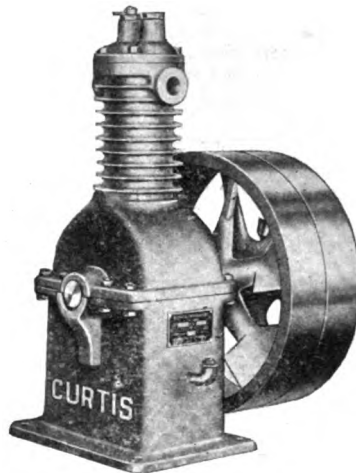
Marketed by the Defender Auto Lock Co., Inc., Marquette Bldg., Detroit, Mich.

The Consol Automatic Oiler, which is automatic in operation and dirt proof, has many distinct features, fully protected by patents not heretofore used in any oiler. It is neatly made and comes in several styles and finishes. It absolutely prevents leakage of oil onto the bearing when the car is not in motion, for it takes the vibration of the car itself to upset a little ball valve which automatically controls the flow of oil from the cup. Already several automobile manufacturers have placed orders for these oilers, recognizing in same a distinct improvement over other oilers. The company is just starting the production on a large scale.

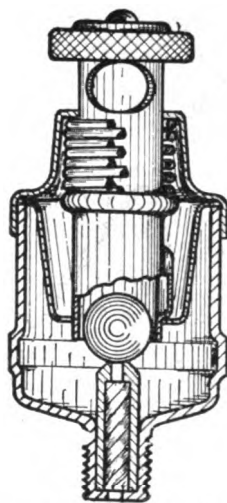
Manufactured by the Consolidated Machine Co., Detroit, Mich. Write for prices and literature.



The Liberty Plane.



Curtis Air Compressor.



Consol Automatic Oiler.

The Weston Garage Testing Instrument indicates and locates accurately and quickly the troubles to which electrical systems are liable. Among these are those attributable to deteriorated or run down batteries; short circuits or grounds at any point due to worn sockets; open circuits due to vibration, abrasion or loose lamps; leaks that result in continuous discharge of batteries; brush troubles in the motor or generators or worn commutators, etc. The Weston instrument detects these troubles and is reliable, permanent in calibration and generally serviceable. The instrument illustrated is the Weston model 280 voltammeter, with external shunts for ampere measurements. It is pocket size, has a uniform and legible scale, is quick in action and is shielded from disturbing influences of external magnetic fields. With its six different ranges (300, 30 and three amperes and 30 and three volts and 100 millivolts) it is actually six instruments in one. The price of the instrument is exceedingly low for such equipment. The special inducements offered by the manufacturer will interest every progressive member of the trade.

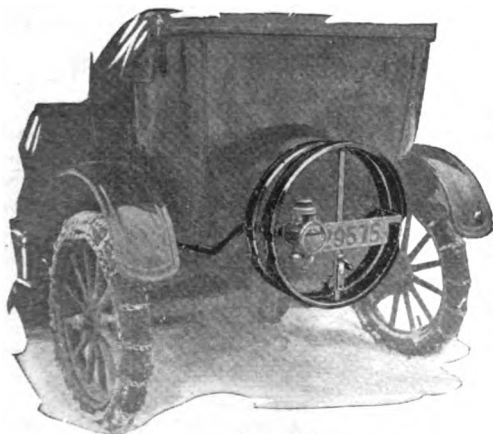
Made by the Weston Electrical Instrument Co., 103 Weston Ave., Newark, N. J. Write for illustrated literature and prices.

The Curtis Air Compressors for garages and service stations are said to possess exclusive features of unquestioned merit and are guaranteed by the manufacturers who have manufactured pneumatic machinery for over 25 years to furnish a continuous supply of cool, pure, clean air, free from oil. In the Curtis compressors the oil leakage into the cylinder has been overcome by their patented control splash oil system, which regulates the oil supply, permitting only enough oil to reach the cylinder to lubricate it without leaving any excess that can be carried into the discharge line. The result is that practically no oil can get into the tires to rot them and it is claimed that the compressor will run on one-tenth the amount of oil ordinarily required by a splash oil compressor. Handled through the jobbing trade exclusively.

Manufactured by Curtis Pneumatic Machinery Co., 1621 Keiolen Ave., St. Louis, Mo. Write for prices and catalogue.

The Lockfast Tire Carrier can be attached to the rear end of any type Ford in a few minutes with a wrench. It is made for one or two tires or demountable rims, holding them in the proper position and securely locking them against theft.

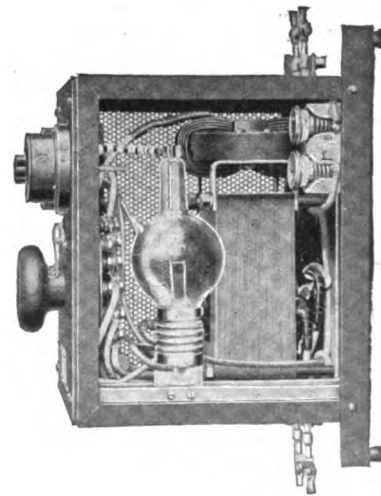
Manufactured and guaranteed by the Lockfast Manufacturing Co., Cleveland, O. For one tire or demountable rim, price \$5.50; for two tires or demountable rims, \$7. Chas. M. S. Foster, sales director, 243 Columbus Ave., Boston, Mass.; Gray Heath Co., 1440 Michigan Ave., Chicago, Ill.; Geo. L. Holmes, 1733 Broadway, New York.



Lockfast Tire Carrier.



Smith Auto Signal.



Tungar Rectifier.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

The Panvar Car Refinisher is a lasting liquid luster that can be handled with excellent results by the amateur. It dries over night and is quickly applied, is self-leveling (which means that it will dry out evenly and not show brush marks), dries with a hard, glossy finish, and being transparent can be used on any colored car, seats, tops and plated parts. Luster will last as long as varnish, and the makers claim will not crack, creep, peel or turn white from the effects of water or steam. Sells for \$1.50 a quart. A quart will do a car.

The Panvar Co., 706 Bulletin Bldg., Philadelphia, Pa. Write for trade prices.

The Dow Body Brace for Ford Cars stiffens the body and gives rigid support to the running boards, preventing the latter from giving and working loose from constant use. It is made of a strong steel angle brace, which is secured to the frame midway between the axles with board sections at the ends, which fit in the channels of the running boards. The weight complete is 12 pounds.

This device enables the owner to carry such accessories as batteries, tool boxes, baggage, etc., that would bend the running boards without a support.

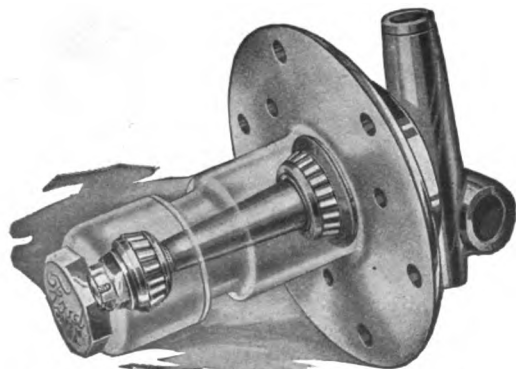
Made by the Dow Wire and Iron Works, Louisville, Ky. Retail price, \$3.

The Wright Roller Bearing is designed for the front wheel spindles of the Ford car, exactly similar to bearing now used for high class automobiles. This bearing is unique in that it has no cage or retaining mechanism to hold the rolls in the raceways, and it is thereby possible to use more rolls than the conventional type of roller bearing. The makers claim approximate increase of 50 per cent. in the number of rolls possible in the same size bearing. It fits the Ford spindle with no mechanical change and presents no more difficulty in installing than the replacement of the present bearings.

Marketed by the National Bearing Service Co., Philadelphia, Pa. Write for prices and literature.

The Peugeot Type Cylinder Head should be an attractive proposition for the owner who is remodeling his Ford car for speed work. This cylinder head is made of a special grade of semi-steel nickel plated and water jacketed, and fitted with 16 overhead valves, which open directly into the explosion chamber and are operated through push rods, which extend to the regular Ford tappets. The design is such that the spark plugs are located in the center of the combustion chamber. All holes in the cylinder and manifold are Ford standard, therefore no drilling or tapping is necessary. The application of this head is very simple and the makers claim an increase of approximately 100 per cent. in horsepower and much gasoline efficiency.

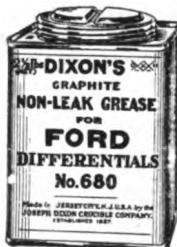
Manufactured by Laurel Motors Corporation, Anderson, Ind. Price, \$95.



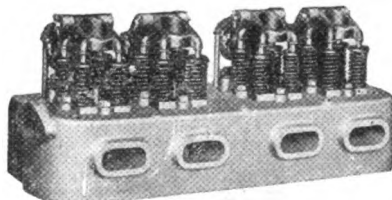
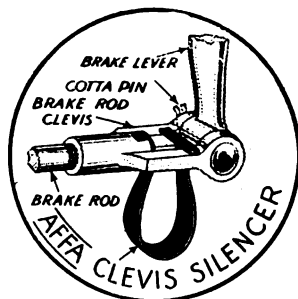
Wright Roller Bearing Designed for the Ford Car.



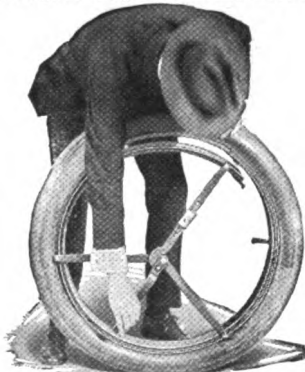
Panvar Car Refinisher.



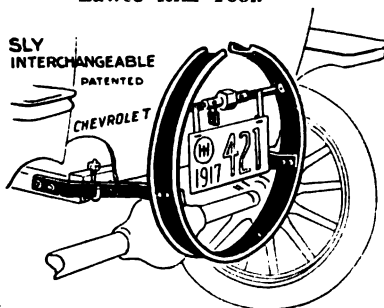
Dixon's Non-Leak Grease.



Peugeot Type Cylinder Head.



Lawco Rim Tool.



Sly Tire Holder.

The Lawco Rim Tool removes a tire from any demountable transversely split rim in a minute or less. The tool is easy to adjust, easy to attach and will give quick results. As shown in the illustration this rim wrench is simply a set of claws that can be hooked over a rim and contracted by the simple motion of a lever. After the tire has been repaired it can be replaced while the rim is still in the grip of the tool. A toggle or reverse movement of the lever expands the tool and the rim as much as may be necessary to cause the ends to meet and permit latching. This tool may also be used to break open any rim latch. It is made of forged steel and is strong and simple in design.

Manufactured by the F. H. Lawson Co., Cincinnati, O. Price \$3.50.

Spok Tite is a liquid preparation which tightens loose spokes and stops body squeaks. It is said to be uninjurious to painted or varnished surfaces and when applied causes the wood to swell and resume its normal proportions. The can is furnished with a handy spout and upon signs of looseness in the wheels a few drops of Spok Tite are squirted into the crevices formed by the drying up of the wood. The wheels may be left in place for the treatment and the action of the liquid is rapid.

Represented by Charlie Foster, 243 Columbus Ave., Boston, Mass. Write for prices. Distributed by Asch & Co., 16-24 W. 61st St., New York City, and Gray, Heath Co., 1440 Michigan Blvd., Chicago.

Dixon's Non-Leak Grease No. 680 solves the problem of grease exuding from the rear axle to the brake bands and wheels of the car. Excess grease not only detracts from the appearance, but also produces a danger element, in that the lubrication of the brake bands prevents their proper functioning. It is composed of selected flake graphite, thoroughly mixed with a special adhesive lubricant.

Manufactured by Joseph Dixon Crucible Co., Jersey City, N. J. Write for booklet and dealer's proposition.

The Sly Interchangeable Tire Holder is designed for both Ford and Chevrolet cars. It resembles a quick detachable rim and is bolted to the rear of the car. When the tire is in place an expanding device is turned, locking the tire upon the rim or holder, and can be used with or without demountable rims. A padlock prevents the loosening of the expansion nut and prevents removal by an unauthorized person. On the holder are provided place for a number plate and a tail lamp.

Manufactured by New Era Spring and Specialty Co., 1177 Hamilton Ave., Grand Rapids, Mich. Write for prices. Special terms to jobbers.



Spok Tite.

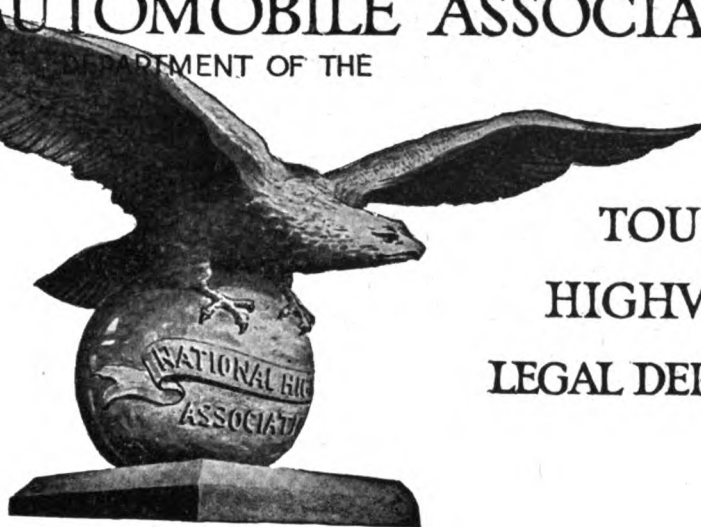
(When Writing to Advertisers, Please Mention The Automobile Journal.)

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Cooperative Effort in Traffic Regulation

Commissioner Stoeckel of Connecticut Outlines Plan
To Eliminate the Careless and Reckless Car Operator
In Improving Highway Conditions for Motor Traffic

On several occasions recently the attention of the members has been called to the activities of the Commissioner of Motor Vehicles in the State of Connecticut, Robert B. Stoeckel, who has inaugurated a campaign of traffic regulation that is unique in many respects. That this campaign seems to warrant so much publicity is not due to the fact that it is desirable to warn motorists against prosecution, but that the Connecticut authorities are proceeding in the regulation of traffic along practical lines, striking at the root of the trouble by eliminating the reckless driver and the chronic speed maniac with the object of making the highways in that state safe for all motorists.

Fair With Everybody

The general spirit of cooperation that has been invoked in the campaign is another meritorious feature and one that will bring quick results. Other states would do well to adopt many of Commissioner Stoeckel's ideas in improving highway conditions for motor traffic.

In a recent interview the commissioner gave an outline of the policies that are being pursued in his department in carrying out the work, which is printed in part as follows:

"Our work is still in the experimental stages," he said. "Our first purpose is to be fair with everybody. Our object is to teach all people who use the highways

of Connecticut that there is an automobile law, and that they must be familiar with it, and comply with it. We are going to use every possible means of bringing that about.

Safety In Education

"Some people may think we are severe at first. We shall have motorcycle men of our own out patrolling the roads. There are hundreds of violations of the automobile law that must be stopped. Some of them, it is true, are only slight infractions, but it all contributes to that impression that a thing is all right if a man can get away with it. That breaks down the spirit of the law and leads to accidents and fatalities.

"We are using first our own forces; we are going to ask and expect to get the cooperation of the public utilities companies in the matter of enforcement. We will work with and coordinate the efforts of the highway department, the state police department, and most important, the town officials. If we go out and make a number of arrests on a Sunday the other towns sit up and realize how much money there is in it, and for a week or two all the constables in that section are out making arrests. We are going to regulate this matter and the act creating the department gives that power to make the enforcement of the law a matter of education and safety for

the public, and not a matter of revenue.

"There are so many details to work out that it is a big job for the summer. For example, our accident reports at times indicate that the cause of accident is due more to the condition of the highway rather than the drivers. We had a number of minor accidents in Hartford at the South Green. Our investigation showed that the street lights there were not properly placed and left a dangerous shadow. A light was removed to a better location and there has not been an accident there since. Another bad place

Eliminate Dangers

in Hartford is at the Memorial Arch. The walks across the park, coming to the street just in back of those great brown-stone pillars, invite people to step out from an obscure place immediately into the path of traffic, and the driver has no chance to see them. Cars going up the hill will naturally pick up speed to make the grade, and there you have all the fixings for a bad accident. There have been accidents there and I shall recommend that two railings be placed there, the one on the west side of the street running south about 25 feet from the arch, and the one on the east running about 25 feet north. That will stop people stepping from behind those columns in front of any vehicles.

Connecticut Law Must Be Observed

"Our inspectors on the road are constantly finding these things that were nobody's business before, and as we find them steps are taken to make corrections. That in the main is the policy of the office in the work of educating the public.

"The enforcement proposed will mean a great many arrests before people realize that in Connecticut the law must be observed. We are already getting returns from the few weeks work we have been doing in this direction. It is going broadcast through New York state and through Massachusetts that this is a bad state in which to take any chances. More arrests will give a still greater circulation to that impression, and that is just what we desire. In both the matter of enforcement and of education we shall also depend very largely on the cooperation of the newspapers of the state. They have helped already and we shall look for further aid from them."

Chief Inspector Verner Gidman is in personal charge of the work of enforcement of traffic regulations. There is an inspector in each county and on special occasions, special inspectors may be sworn into service. There are three regular motorcycle men on the road now for the department, and a fourth will probably be added. They are working with members of the state police depart-

ment who do motor patrol work, and Mr. Gidman directs operations. On Sundays, when traffic is especially heavy, in addition to the motorcycle force, several other inspectors are put out in automobiles. They wear khaki uniforms and look like any other motorists on the road. They have been obliged to speed up to 74 miles an hour to land offenders.

May Suspend or Revoke License

It is not their purpose to make wholesale arrests on the slightest pretext and they often overhaul a car that is showing a tendency to get ahead of everything else on the road and give the driver a warning. The inspector at the same time makes a note of the time and place, the car and the driver, and a report of it is filed in the commissioner's office. If he repeats the offense anywhere in Connecticut his only warning then is to appear before the commissioner and answer to charges which may mean revoking or suspension of license. The driver who comes racing along on the road is arrested at once and taken before the court. He must also satisfy the commissioner that he is entitled to hold his license.

"In exercising the right of revoking licenses, or of long suspensions," said Commissioner Stoeckel, "we hope to eliminate the careless and reckless driver, and the habitual offender. We

Unusual Comment on Speeding Case

can do it now under this system. That is the penalty for those who will not get into line with our enforcement. We will be fair, but we are determined that the man or woman who repeatedly violates the law shall not drive to endanger the lives and health of others."

Recently inspectors were working in the vicinity of Westport, Conn., where there were speeders of the most reckless sort, and during the afternoon six were landed in the Westport court and given fines and costs that amounted to \$38.51 each.

Judge Joseph G. Hyatt of the Westport court in passing sentence on a group of these offenders made the following comment:

"In endangering the lives and limbs of others you have not the slightest excuse for your conduct. None of you are on business today. You are not responding to any emergency that calls for such speed. The thing that impresses me is that it is all so unnecessary. You may live in New York, or New Haven, or wherever it is, it makes no material difference whether you get home at 7 o'clock or at 9 o'clock tonight. You have fast cars and want speed and more speed, just for the joy of speeding, regardless of the lives and safety of law abiding people who are exercising their rights to use the highways properly."

CAUTION IN PASSING ELECTRIC CARS.

The Bay State Street Railway Co. is displaying the following signs on their cars, "Autoists passing cars obey the law and safeguard our passengers," and the employees of the electric railway in Massachusetts have been instructed to report numbers of all automobiles whose operators do not comply strictly with the following regulation: "In approaching or passing a car of the street railway which has been stopped to allow passengers to alight from or board the same, the operator of every motor vehicle shall not drive such vehicle within eight feet of the running board or lower step of the car then in use by passengers for the purpose of alighting or boarding except by the express direction of a traffic officer, or except at points where passengers are protected by safety zones.

SPOONING MOTORISTS BEWARE OF COHASSET.

Chief of Police Bates of Cohasset, Mass., has decided that Dan Cupid is persona non grata as a passenger in an automobile in his town and has announced his intention of prosecuting car operators who are under Dan's influence. He said that dividing one's attention between a girl and the operation of a car is a dangerous practise and one that has resulted in a number of accidents. The

charge of reckless driving will be made, as the chief believes that a car is not under control when the operator has one arm about his companion's waist, or has her in his lap with both arms around her waist on the pretense that he is instructing her to drive.

While the chief's intentions are of the best, it is probable that he will succeed in keeping the spooning motorists from his jurisdiction, but doubtful if he will make much headway in dampening Cupid's activities.

Nantucket Admits Automobiles

The people of Nantucket, which is an island lying south of Cape Cod, have voted to admit automobiles to their "Empire," the voters on May 15 accepting the act passed by the 1918 Legislature, which repealed the law passed in 1913 under which motor cars were excluded from the town.

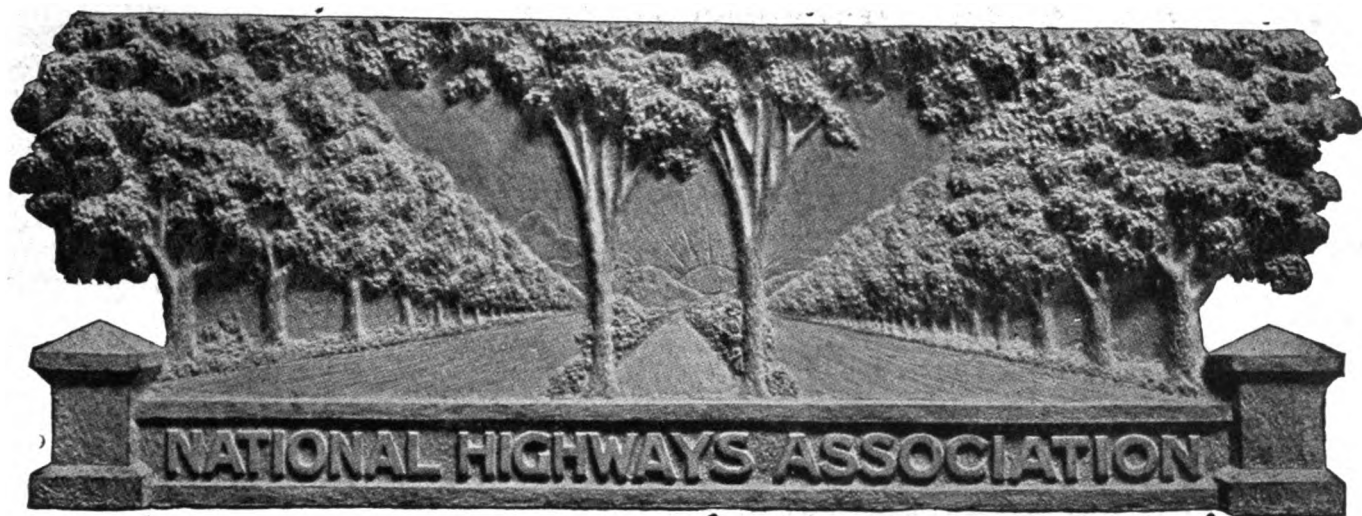
Agitation over the question of using automobiles on the island has been going on for some 12 years and many attempts were made to secure the admission of machines. Several individuals brought cars to the island and operated them with the intention of testing the law, but the law was upheld and those who attempted to operate their cars enjoyed but brief rides, as these trips

usually ended in front of the court house and the operator was fined.

W. V. Birney, an artist, did operate a car all one season on the island, but he never brought it up on Main street in the village, but left it around the corner by the postoffice when coming to town. Often when returning for his car he found the tires flat. This experience, together with that of being ostracised by the townspeople, discouraged the artist in further attempts to enjoy the use of a car on the island.

A Boston man took a car to the island in 1907 for the purpose of testing an exclusion ordinance which the selectmen had passed that year. The chief of police served papers on the car owner and he was summoned to trial, but whether he or the authorities won the case is not on record.

Clinton S. Folger, the mail carrier between Nantucket and Siasconset, was the first native to buy a car and bring it to the island. He arrived in town on Nov. 5, 1913, with his new car and was received by almost everyone in the village. For a while he operated the car and was not molested by the authorities, but after they passed another exclusion ordinance his troubles commenced and he was haled into court a number of times before he finally decided to lay up the car. He kept the car on the island, however, and was the only one who could avail themselves of the privilege to operate when the ban was lifted last month.



Bill In Bay State To Surtax Cars Is Killed

THE bill for a surtax on motor vehicles and operators which was introduced in the Massachusetts Legislature as a means of gaining additional revenue has been killed, the ways and means committee, which received the measure after it had a stormy life in the hands of other committees, recommended that the measure be withdrawn.

Another bill which was looked upon as unjust legislation against car owners and dealers, which provided that they hold used cars several days before selling them and send reports to the state and local police, was referred to the next general court, which disposes of it for the time at least and probably means its death.

The motor car organizations strongly and righteously protested these measures and it was largely through their efforts that these bills were turned down, facts which bring out strongly the value of organization and membership in the associations that through strength of numbers can oppose successfully discriminatory and confiscatory legislation.

Massachusetts owners and operators of motor vehicles, however, may soon be called upon to pay increased fees in order to raise \$5,000,000 for the care of highways, according to James W. Synan of Pittsfield, a member of the Massachusetts Highway Commission.

"We must have more money, not only to build new roads, but more especially to keep our present highways in repair," he said. "The increase in motor vehicles, particularly in trucks, is really enormous. In 1917 we registered 27,000 commercial vehicles. Last week we passed that figure for the current year and we feel certain that at least 7500 more will be registered before Dec. 31. In fact, it would not surprise us at all if the total registration of trucks this year went higher in view of the increasing railroad freight rates.

"There has already been an increase because of the higher railroad freight rates, and we find that much of the

freight which was formerly carried by the railroads is now going over our highways. There are through routes from Boston to New York, with trucks operating on an established schedule.

"In certain cases operators of trucks are using trailers because they know the truck alone cannot carry the loads of 10 to 12 tons they have to haul. So they draw a trailer. Our roads simply cannot stand up under such loads and we have either got to allow them to go to pieces or raise the money for rebuilding them.

"To build roads which will stand such loads will cost at least \$50,000 a mile, and there are several hundred miles of road that must be rebuilt in the near future. We will also have to widen many of our through roads, because the trucks are getting wider all the time and on some of the roads it is actually dangerous at present for two of the vehicles to meet on the highway.

"Prior to 1914 we built state highways 15 feet wide and that was ample for the traffic they were then carrying. Since then we have been building the roads 18 feet wide with a shoulder which gives a little more than 20 feet of operating surface. But fully 20 feet are required for two of these heavily loaded trucks to pass, and on our highways as they are now built it means that at least one of the vehicles, and frequently both, are running off the shoulder and undermining the surface of the road.

"On the older and narrower roads it is extremely dangerous for these vehicles to meet, and also when the driver of a pleasure car attempts to pass big trucks.

"There are, of course, just two ways of raising the money we must have for the highways. It can be taken out of the general tax levy and assessed upon all the people, regardless of whether they use the highways, or it can be raised through an increase in the fees assessed upon motor vehicles and their operators. Personally, I feel that a commercial truck carrying 10-ton loads long distances each day should be required to

contribute more than \$15 to \$20 a year to the repair of the highways; as a matter of fact, the damage it does to the highways every day amounts to more than its license fee for the entire year. It is a matter, however, for the Legislature to decide; all this commission can say is that we must have more money.

"Shortage of men and greatly increased cost of materials may prevent any substantial new road work during the progress of the war—but roads must at least be kept in reasonable repair now and every day and traffic conditions will force their rebuilding on a very much more substantial plan the first moment men and materials are available."

This new attempt to single out the automobile to shoulder the burden of taxation for new roads is as unjust as the previous ones, as good highways are a benefit to the whole people and funds for their construction should be raised by general taxation.

MAINE DEMANDS CLEAN PLATES.

Edward Allen, Automobile Inspector of the State of Maine, has warned car owners using the highways of that state to keep their number plates clean so that the characters will be legible to officers or citizens at a reasonable distance.

LOST PEERLESS HUB CAP.

C. H. Traiser of 530 Beacon street, Boston, Mass., lost the hub of his Peerless car on Huntington avenue, near the Opera House, on Tuesday, May 21.

LATEST TRAP NEWS.

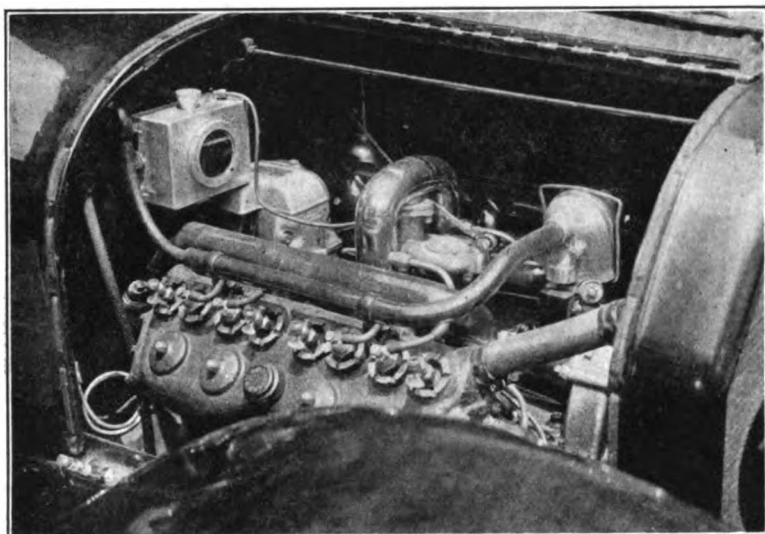
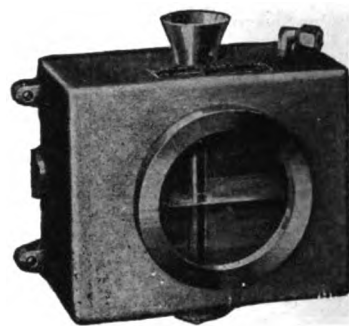
Traps are being worked in the city of Marlboro; on the state road near Williams tavern; on the Washington street boulevard; on Grove street in West Roxbury where there is both a horn trap and speed trap.

The Esta Auxiliator

An Instrument That Mixes Moist Air with Engine Fuel,
Increasing Power and Maintaining Constant Efficiency

MAINTENANCE of maximum engine efficiency is briefly the claim made by the Esta Co., which has executive offices at 1838 Broadway, New York City, for an instrument it manufactures known as the Esta Auxiliator, that is connected with the engine and while improving the combustion of the fuel obviates conditions resultant from combus-

claims made by the Esta company in an intensive advertising campaign just inaugurated, and the claims made are really the findings from the tests, with explanations of what results are practicable from the use of the instrument. Numerous conclusions may be drawn, many of which have every foundation of fact, but all can be summed by the



The Esta Auxiliator Installed on a Cadillac Engine, the Pipe Line Directly Connected with the Intake Manifold.

tion that gradually reduce power production.

The Esta Auxiliator is in effect the application of a principle that has been well established in steam engine practice. The instrument itself is extremely simple and continuous service for any period of time does not lessen its efficiency. While the statements made are in a sense general the specific results obtainable have been established by tests made with engines equipped with Esta Auxiliators at the laboratories of the Automobile Club of America and Pratt Institute, both of New York City.

The Automobile Club of America has equipment for testing the automobile vehicles of members or others who wish to avail themselves of its resources, and the records, certified by the club officials, are regarded as absolutely impartial and dependable. The results of tests made at Pratt Institute can be regarded as having the same dependability and accuracy. While one series of tests might be regarded as sufficient the purpose of the Esta company was to obtain facts that would be satisfactory and convincing, coming from two entirely different and recognized authorities.

Records Made from Scientific Tests.

The records, obtained by uninterested, scientific men, with highly perfected apparatus, establish the basis for the

phrase "constant maximum efficiency."

To deal with the use of the Auxiliator necessitates stating certain facts concerning fuel oils and methods of carbureting air with them, that the principle of operating the device may be clearly understood. Hydrocarbons are combinations of hydrogen and carbon, which are in three classes, gasses, liquids and solids, liquidity and solidarity resulting from increase in molecular weight. These are in a general sense combustible.

Any hydrocarbon gas may be burned when mixed with oxygen, each in certain ratios. Any hydrocarbon may be burned similarly, but to obtain what will ignite and burn practically instantaneously necessitates mixing it with that proportion of air that will supply

the necessary volume of oxygen. This mixing is known as carbureting the air, which is accomplished by drawing atmosphere over the surface of a pool of hydrocarbon, or by spraying or atomizing it into the air, a current passed through a device at such velocity that it will be so impregnated that it will burn when an electric spark is made in an engine cylinder. Obviously the more volatile the hydrocarbon the more complete will be the carburetion.

Primarily a carburetor is an instrument with which a flow of hydrocarbon liquid from a tank and a flow of air can be combined and each so proportioned by convenient means of adjustment that a fuel can be supplied to an internal combustion engine. Practically all carburetors are automatic in operation so long as liquid hydrocarbon is supplied. Theoretically the carbureted air ought to burn equally well at all times and in all conditions, but in practise this result is not obtained. The variance may be due to a number of causes, among which may be specified carburetor design, quality of hydrocarbon, temperature and the character of combustion.

Why Carburetion Will Vary.

Carburetors as instruments may be regarded as any other mechanical device, as having efficiency in ratio to the quality, which from an engineering point of view has been very well established.



One of the Show Windows of the Motor Specialties Co., Boston, Mass., During the Esta Week Demonstrating Campaign.



Window Display of the Bolce-Perrine Co., Boston, One of the Well Known New England Distributors, Which Was a Feature of Esta Week.

Theoretically a carburetor when once adjusted ought to function continuously to a given standard, but the quality of fuel will vary, temperature will change and the consumption of carbureted air in the engine will become more and more defective, due to wear of parts and the accumulation of products of combustion in the cylinders, which is generally known as "carbon." These accumulations, which theoretically would not result were combustion perfect, form on the piston heads, in the cylinder heads or combustion chambers, on and around the valves, and consist chiefly of dust drawn into the engine through the carburetor, metallic particles and residuum of lubricating oil, which is gradually baked until it is hard and coke-like. This "carbon" may become incandescent from the intense heat of the explosions, which will sometimes reach 3000 degrees of temperature or higher, and cause ignition of the gas drawn into the engine by its suction strokes before it is fully compressed and before the pistons reach the tops of the cylinders. Preignition causes deterioration of engine bearings, which is followed by abnormal wear of all reciprocating parts, and carbon on the valves or valve seats will prevent the valves closing and defective compression. All of these mean excessive consumption of fuel and lubricant and lessened power.

Auxiliator Adds Oxygen to Fuel.

Obviously in an automobile engine the fuel and the lubricating oil are hydrocarbons, and the hydrogen in both are consumed in proportion to the quality or character of combustion in the cylinders. Theoretically, the carbon unconsumed ought to be expelled in the form of engine exhaust. If accumulated it will remain in the cylinders. If there is a sufficient volume of oxygen in the cylinder the excess carbon will be burned, and the purpose of the Auxiliator is to supply additional oxygen to the engine so that the combustion will be much more thorough. The instrument is a small tank designed to contain water, through which air is drawn into the intake manifold of the engine, and this air, impregnated with water, supplies the necessary oxygen to complete combustion of the carbureted air and the lubricating oil that may find its way into the cylinders.

The theory is simple. Water is composed of two parts hydrogen and one

part oxygen and when heated these gasses are disassociated and both are highly combustible. The moist air contains a sufficient volume of hydrogen and oxygen to insure much more perfect combustion. With an Auxiliator connected with the engine the fuel is practically all consumed, there is little if any accumulation of carbon, and efficiency is not impaired save when operated for very long periods of time and very gradually, so that greater power is obtained from a given volume of fuel, better lubrication is assured, and maintenance or repair costs are materially decreased.

The Principle of Operation.

The Auxiliator is an aluminum tank that may be located in any convenient place, but preferably on the dash and under the hood. In the top of the tank is a funnel-shaped tube, the lower end of which is just above the bottom. In this end is an annular opening. The tank is half filled with water through the funnel. In the front of the tank is a circular glass that serves as a height indicator of the content. On an upper corner of the tank is a nipple from which a flexible copper pipe or tube is carried to and connected with an 11/32 inch hole drilled in the intake manifold above the

carburetor and tapped with a 1/8 standard iron pipe tap. Through the funnel and water content and the pipe air is drawn into the intake manifold by the partial vacuum in the intake, that is sufficiently impregnated with moisture to strongly affect combustion. With engines having no external manifold, but having fuel supplied by vacuum system the connection of the copper pipe is made direct with the fuel feed line by inserting a "T" and drilling the connections to 1/8 inch to obtain sufficient vacuum to operate the fuel system and the Auxiliator.

The Auxiliator can be cleaned by drainage. It should be filled to the level each day. Filling is easier if the engine is started before adding the water. The engine can be cleaned of carbon by filling the tank to the top, and adding it as used, slowly idling the engine and accelerating it quickly and frequently to draw water into the intake and the cylinders, the carbon being exhausted through the exhaust manifold.

Reports of Efficiency.

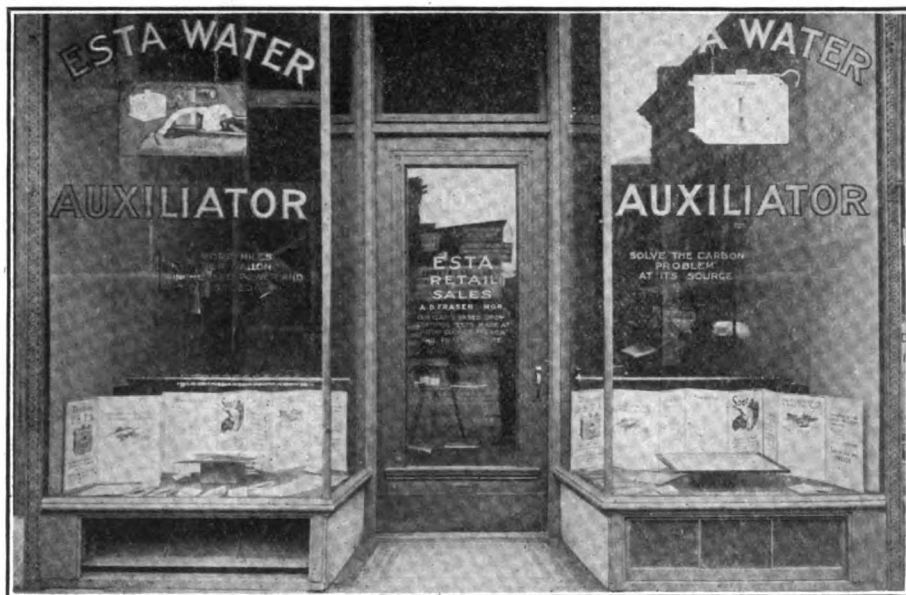
With reference to fuel economy, the following reports are self-explanatory:

"As regards the decrease in fuel consumption when using the Esta Water Auxiliator, the greatest amount, which was as much as 43.5 per cent., took place when the motor was idling with no load.—Automobile Club of America.

"At the end of this test there was shown an average decrease in fuel consumption of 25.5 per cent., and an average increase of 27.5 per cent. in speed, over the first test, while the engine was developing almost 35 per cent. more power.—Pratt Institute."

With reference to decarbonization, the record of the Automobile Club of America states: "Near the end of the decarbonizing run there was obtained in one hour's time an increase in speed of 35.7 per cent., and of power 35.6 per cent.; also a decrease in fuel consumption of 17.2 per cent."

During the week beginning May 20 "Esta Week" was featured by jobbers



The Retail Sales Department of the Esta Co., 103 Massachusetts Avenue, Boston, Showing Auxiliators, Literature and Certificates of Records.

and distributors throughout the country, they making demonstrations in their stores of Esta Auxiliators, and making window displays of the instruments and special literature and copies of the certified records of the Automobile Club of America and Pratt Institute. These were continued as features for the week in practically all commercial centers. Some of the feature window displays which were made by representative dealers in Boston, are shown in the accompanying illustrations, and these attracted the attention of a very large proportion of automobile owners and drivers.

WALDEN-WORCESTER REPRESENTATIVE MAKES SERVICE TRIP.

Mr. Charles A. Shedd, mechanical superintendent of the Walden-Worcester Co. of Worcester, is making a thorough trip of the western part of the country in the interest of the new "Walden Service." He is calling on all the large jobbers and service stations, solving any kinks that they may have, explaining the use and devising new methods for application of Walden-Worcester wrenches.

GEORGE W. HOYT CHIEF ENGINEER OF OAKES CO.

George W. Hoyt has resigned his position as chief engineer of the Harroun Motor Corporation to accept a position as chief engineer with the Oakes company of Indianapolis. Mr. Hoyt will have charge of engineering the development work in connection with the production of Oakes cooling fans. He was designing engineer for the Amplex Motor Car Co. for six years. He also served the Marmon company for three years in the same capacity. For two years he was assistant chief engineer for Maxwell and was associated with Mr. Harroun at the time the Maxwell cars were being raced.

GRAPHITE FOR BEARING LUBRICATION.

When overhauling a car the wise motorist will not overlook the slightest chance for a needed repair or replacement. Especially now that a shortage of both new and used cars is certain, the greatest care in keeping the car in good running order is imperative. Some of the most important parts of a car and the parts most susceptible to wear if not properly watched, are the bearings. Bearing failures are usually due either to improper adjustment or improper lubrication. One of the first rules of bearing lubrication is that the lubricant must not contain any water, acid, alkali or any kind of abrasive. Such substances will greatly effect the highly polished surfaces of races, balls and rollers. According to engineers of the Joseph Dixon Crucible Co., the most satisfactory bearing lubricant is their mixtures of oils or grease and graphite. Selected flake graphite is used in Dixon's Graphite Automobile Lubricants because of its ability to fill up minute holes in the polished surface of the bearing. It is said of flake graphite thus used as a lubricant that

"the more it is rubbed, the smoother it becomes." The oil or grease is used more or less as a vehicle to carry the graphite to the surface of the contact.

METAL HOSE AND TUBING CO. ERECTING ADDITION TO PLANT.

To meet the constantly increasing demand for its product and particularly to care for the requirements imposed by the war, the Metal Hose and Tubing Co., Brooklyn, N. Y., makers of Triplex Gasoline Hose, has started construction on an addition to its plant. The building is of permanent construction in brick. The new space will give 5000 square feet more for manufacturing purposes and the factory will immediately require all of it.

CANADA RANKS THIRD IN NUMBER OF AUTOMOBILES.

Canada ranks third among the countries in the world in the number of motor vehicles owned and operated, said President L. B. Howland of the Canadian Automobile Association, at the annual meeting of that organization held in Ottawa. There were more than 200,000 cars in operation, the increase over the preceding year having been 100 per cent.

Much purchasing has been done by the western farmers, he said, and the motor car had become an important factor in food production in saving time.

CAR INSURANCE RATES FIXED AT CHICAGO MEETING.

The executive committee of the Western Automobile Underwriters' Conference was recently held in Chicago. The charge of 15 per cent. for a car valued at or under \$2000 not equipped with an improved lock was adopted to take effect June 1. Several other matters were referred to the meeting of the National Automobile Underwriters' Conference, which will be held in New York City.

STRONG CLAIMS MADE FOR NEW TYPE OF ROTARY ENGINE.

T. L. McCaskill, an Albany man, has invented and has been granted a patent for a new rotary gasoline engine which is said to involve new mechanical ideas of importance. The claim is made for the new motor that it will revolutionize the motor car industry and greatly add to the efficiency of the aeroplane. Steps to place the new engine upon the market are now being taken by Mr. McCaskill and others interested.

AUTO PARTS OF MILWAUKEE NOW BADGER MANUFACTURING CORP.

The Auto Parts Manufacturing Co. of Milwaukee, well known manufacturers of Badger accessories, including bumpers, steering wheels, tire carriers, cutout valves, etc., has changed its name to the Badger Manufacturing Corporation. The name Auto Parts being used by a number of other accessory manufactur-

ers, wholesalers and retailers, to individualize themselves and incidentally "tie up" to their Badger line of accessories, the Auto Parts of Milwaukee will henceforth be called the Badger Manufacturing Corporation.

"DEFENDER" PAYS FOR ITSELF IN COST OF THEFT INSURANCE.

"Insurance companies will pay owners of Ford cars not only for all expense they are put to in equipping their machines with Defender Auto Locks, but also give them an additional reward." According to the National Underwriter this is the way they do it: They will reduce the cost of theft insurance 15 per cent. each year. This reduction will save enough in two years time on any style of Ford car to pay for Defender Auto Lock. On some styles in some places the saving in one year will be equal and even exceed the cost of the lock. When the new "penalty premium" is made effective in the big cities the saving from a Defender Auto Lock the first year will be four times its cost.

"All of the saving after the cost of the lock has been equaled is a reward—a clear profit.

"Insurance men figure the insurable life of a Ford car is five years. During this time the machine depreciates in value and the amount of insurance consequently reduces. As it depreciates it becomes less of a prize for professional thieves and joy riders. Consequently the biggest reduction in the cost of insurance is made the first year and the smallest saving the last.

"In the larger cities of Chicago, Detroit and St. Louis, where the theft hazard is greatest, a Defender Auto Lock on a Ford car will save the following amounts over a five-year period. This is based on rates not affected by the new penalty charge.

Runabout	\$5.80
Touring Car	6.00
Coupelet	7.45
Town Car	8.60
Sedan	9.25

"Outside of these cities, in the following states, a Defender Auto Lock on a Ford car will save the amounts shown below (Colorado, Iowa, Illinois, Indiana, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, New Mexico, North Dakota, Ohio, Oklahoma, Wyoming and Wisconsin):

Runabout	\$4.05
Touring Car	4.20
Coupelet	5.20
Town Car	6.00
Sedan	6.50

"In the Pacific coast territory the reductions are not quite as large, as the hazard of thefts has not been so great. In the states and territories of Alaska, Arizona, California, Hawaii, Idaho, Montana, Nevada, Oregon, Utah and Washington the amounts saved by the Defender Auto Locks follows:

Runabout	\$3.10
Touring Car	3.21
Coupelet	2.32
Town Car	2.67
Sedan	2.85

Trade Commission Decides Price Fixing Case

When an Article Has Passed from Maker
to Purchaser Latter Owns It and Can
Sell at Any Price Above Cost.

For a considerable time there has been a controversy throughout the country over the question of the right of manufacturers, wholesalers, etc., fixing resale prices at which their articles could be sold, and the right to maintain such resale prices has been contended for by them, and the question whether such right exists has been brought before the Federal Trade Commission numerous times.

Many hearings have been had, many complaints have been made and much consideration has been given to the subject by that commission. Many business concerns have been refusing to sell to customers who would not agree to maintain the resale price fixed by the seller.

The Federal Trade Commission has just disposed of the first of these cases in which complaints have been issued charging violations of law through fixing the resale price of articles, and an order to cease and desist from this practise has just been issued by it in the case of Chester Kent & Co., Inc., of Boston, manufacturers of proprietary medicines.

Attorneys for the company admitted that in the past the practises complained of had been in use. The order, the first in cases of this character, forbids the company to—

(a) Indicate to dealers the prices for which its proprietary or patent medicines shall be resold.

(b) Securing agreements from dealers to adhere to such prices.

(c) Refusing to sell to dealers who fail to adhere to such prices.

(d) Refusing to sell to dealers who fail to adhere to such prices upon the same terms as dealers who do so adhere.

(e) Furnishing any advantage to dealers who adhere to the resale prices, while refusing similar treatment to dealers who do not adhere to the prices.

This order of the commission follows the decision of the Supreme Court of the United States in the American Graphophone company case lately decided by it.

Some of the most distinguished lawyers in the United States have appeared before the commission to argue this question, as well as many of the leading business concerns of the country, some of whom have insisted that the maintenance of resale prices was proper, and others who have contended that it was not. Almost all of the large department stores of the country have been heard in opposition to it.

After full consideration the Federal Trade Commission has decided to issue complaints against all business concerns who refuse to sell unless the purchaser will agree to maintain a resale price

fixed by the seller. The case just decided is the first formal finding by the commission to that effect.

When once an article has passed from the maker to a purchaser he owns it and the owner of such article may sell it at any price that he chooses provided he does not himself sell it at such price as to be below cost, and thus thereby enter into unfair competition with other retailers selling the same article.

This decision is going to be open to considerable controversy in relation to the subject matter thereof, and the matter will probably have to be settled by an act of Congress in the manner suggested by Mr. Justice Brandeis in his concurring opinion in the Supreme Court of the United States, in the case of the American Graphophone company. The Stephens bill, which is now in Congress, is in relation to that matter, but in the estimation of many business men and others it is thought to be broader than it should be. It may be that resale prices can be so regulated by placing the power somewhere protecting against unfair prices as to make it work equitably, and be a fair method of competition in commerce, but that question will undoubtedly have to be settled by congressional action.

WISCONSIN AUTO CO WILL MAKE "SLIP ROOF OUTFITS."

The Wisconsin Auto Top Co., Racine, Wis., manufacturers of the Badger seat covers, are about to introduce to the trade a new type of automobile top covering in what they have termed "Slip Roof Outfits." These outfits are just what the name implies. They slip over the roof of the car and give an old, shabby top the appearance of newness at half the usual price of a new top. Each outfit consists of a new roof, quarters, back curtain with celluloid light and back stays all stitched and ready to slip over the old frame. They are absolutely accurate in fit, as they are cut after the same patterns employed by car manufacturers.

They simplify top renewals and at the same time represent a substantial saving. They are easy to install, anyone who can drive a tack being able to do the necessary work quickly.

NEW CATALOGUE ON COMMERCIAL BODIES.

The Parry Manufacturing Co. has completed the mailing of a very elaborate and comprehensive catalogue featuring their Parry body line, to all the light commercial truck dealers throughout the United States.

In appearance this catalogue is a masterpiece of engraving and printing—a catalogue that its beauty alone will keep on top of a desk. The illustrations and specifications of the various styles of Parry bodies are so arranged and explained in detail that any person can easily tell just what is included as regular equipment or extras.

FRANK HOPEWELL, HEAD OF L. C. CHASE & CO., IS DEAD.

Mr. Frank Hopewell, head of the firm of L. C. Chase & Co., died on April 25, 1918, after a short illness at Pasadena, Cal., where he was spending a few weeks with his wife and daughter.

Born at Shelburne Falls, Mass., in 1857, he was one of the three sons of John and Catherine Hopewell. His father was a native of London, England, but had called America his home since he was 14 years old.

Frank Hopewell attended Springfield, Mass., high school, and the Springfield Collegiate Institute, graduating from the former in 1875 and the latter in 1879. Shortly after he began his business career in New York City and in 1881 became associated with L. C. Chase & Co., one of America's pioneer textile concerns, long identified with Sanford Mills, Holyoke Plush Co., Troy Blanket Mills and Reading Rubber Manufacturing Co.

After a period of seven years given to untiring efforts in the interests of this firm, Mr. Hopewell was admitted to partnership. At that time his brother John was senior partner of the same firm. As partner Mr. Frank Hopewell's remarkable genius strengthened the foundation of the business which was to stand the test of time and be a grand memorial to his life.

His sterling integrity and business ability have helped to place L. C. Chase & Co. in a noteworthy place in the textile field today. He was beloved and admired by all his associates, business and personal. A powerful, clear-visioned, thoroughly American type of man, Mr. Hopewell was a friend to all; big hearted and sympathetic, alert and keen.

He was elected assistant treasurer of Sanford Mills in 1887 and became treasurer in 1896, which office he held until 1915, when he resigned in favor of his nephew, Frank B. Hopewell. Besides being a director of Sanford Mills, he was also a director of Reading Rubber Manufacturing Co. and the Holyoke Plush Co., and was for several years a trustee of the Boston Five-Cent Savings Bank.

Of four nephews of the late Mr. Hopewell, three are directly connected with the L. C. Chase & Co. interests. He leaves a widow and daughter.

AUTOMOBILE SHOW WILL NOT BE AFFECTED BY CHANGE.

The annual National Automobile Show will not be affected by the reported change in control of the Grand Central Palace.

The statement made in the press to the effect that the palace had been sold to the Du Ponts is erroneous. The palace is owned by the New York Central Railroad and is leased for 50 years to the Manufacturers and Merchants' Exchange. What the Du Ponts have bought is a controlling interest in that company.

Mr. E. V. P. Ritter will continue as managing director and Mr. Charles E. Spratt as manager of the furniture exchange. So far as that part of the building used for exhibitions is concerned, no changes are contemplated.

POWER

FROM PISTON RINGS



Pat. March 2, '15; Feb. 29, '16

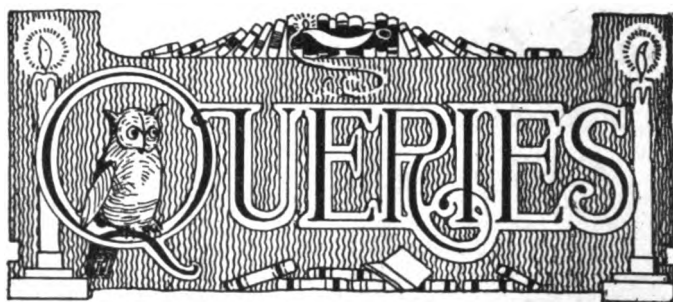
Good oil engineers have found that 80% of the excess oil and unburned gases pass around and behind reciprocating piston rings. The result is lost power and excessive carbon.

Pressure Proof Piston Rings

cannot reciprocate. The spring expander automatically takes up any excess in the ring groove. All possibility of either oil or gases passing between the cylinder walls and the piston is overcome. This is why Pressure Proof Piston Rings permanently eliminate carbon and restore maximum power.

Write for "New Facts About Piston Rings" and special dealer proposition

PRESSURE PROOF PISTON RING CO.
168 Massachusetts Ave. Boston, Mass.



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

WHAT IS THE BEST METHOD OF WASHING AND POLISHING A CAR TO PRESERVE A LASTING FINISH?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the issue in which the question appears. Answers to the question should be in the hands of the editors by the 20th of June. The contest is open to everyone.

HOW DO YOU OBTAIN MAXIMUM MILEAGE FROM YOUR TIRES?

(R. L. Prindle, N. Abington, Mass.)

Best Letter.

The car owner today is fast coming to realize that mileage obtained from tires depends upon the treatment they are given.

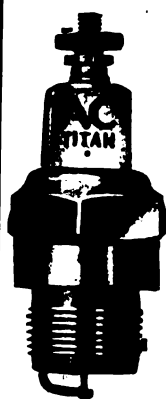
Mileage is built into them at the factory by scientific methods, and the user can get every inch of that built in mileage by proper care and use of it. The motorist ordinarily places so much confidence in his equipment, probably because of its rapid development and wonderful performance, that it does not receive the inspection and attention necessary for best results.

While the selection of the right type and size, correct application and proper treatment of tires are all necessary to obtain the desired results, the simple matter of inflation is probably the most important point in the care and use of equipment, as its abuse is the principle cause of short life.

The judicious use of air will go a long way towards giving one the maximum mileage. Because resiliency and long wearing qualities depend almost as much upon proper inflation as they do upon the rubber and fabric.

Too great air pressure causes excessive vibration, traction slippage and loss of power, while insufficient pressure will bring on excessive friction between various parts of the tire and cause them to break apart.

There is a very definite relation between the air pressure within the tires and the load upon them. The heavier the weight or reduced air pressure causes more deflection, allowing a wider tread on the ground, and increases the action of side walls. But when soft the tire runs against a wave in the tread rubber, which from excessive stretching and heating pulls away and separates from the carcass.



Albert Champion Means AC Spark Plugs

The Standard Spark Plug of America

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PERFORMANCES, not claims, are what count. AC is exclusive equipment on NINETY makes. There is an AC for every type of motor.

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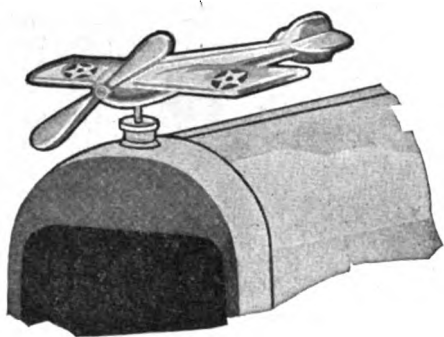
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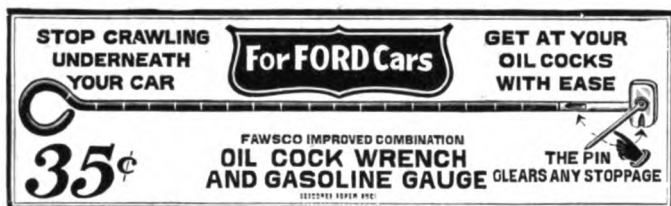
The most attractive and most popular Radiator Ornament ever produced. Fits any car, indestructible, solid aluminum, highly polished, wings hand-painted with flying emblem in Red, White and Blue. The slightest motion spins Propeller arm, and makes it almost seem alive. "It fairly hums with Patriotism". Post-paid \$1.00; order today and get the Agency.

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BUY A TOOL

A notched stick will turn an Oil Cock, but only our device will then tell you whether the crank case is empty or the Cock stopped up.



The Cleaning Pin is PATENTED.

Your dealer can supply.

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The side wall also develops a hinging action as the wheels revolve and can be compared to a wire that is bent back and forth—it becomes hot and finally breaks.

In an uninflated tire the heat generated from increased action of side walls softens the rubber cement between the fabric layers and a certain degree of devulcanization takes place. As a result when the tire strikes a hard substance a blowout occurs.

Demountable and quick detachable rims make it possible to change tires very quickly, but even if not so equipped it is very necessary to stop and give them attention. Damage to the side walls, beads, fabric, inside and inner tube usually make it difficult to make practical repairs.

In an emergency, rags, straw and even oats, stuffed into the casing in place of the tube, if far away from help, or calling distance from a garage, will help the tire to hold its shape. The wise motorist should carry plenty of spare shoes and tubes. As soon as one gets a blowout or puncture the car should be stopped at once and either change or make the necessary repairs. In case the tires are old and there has been several blowouts, a lower air pressure will be desirable.

An air pump attached to the engine is the best solution of this important matter of air pressure. If one cannot afford the power driven kind, the next best kind is one that clamps to the running board and is operated by hand without much effort. With care the guaranteed mileage of 3600 miles may be stretched to 8000.

Running in car tracks is very injurious, as this causes undue strain to the side walls, for which they were not designed, and small bits of steel from the rails are picked up, while the frogs of the track are a constant source of injury.

Everyone realizes what happens when a pair of rubbers are worn on the feet that are just a little smaller than the shoes. The sides of the rubbers or uppers turn over, allowing them to come in contact with the ground. The excessive wear breaks them down and cracks soon develop before the

soles themselves begin to wear.

This is what actually happens to a tire when it is driven on the rails.

It is a very good plan to shift the tires to different wheels occasionally. When a new tire is purchased to be carried as a spare, do not chain it to the back of the car in the sun and dust, or it will crack, dry out and lose its liveliness. It should be put to work at once, run a few hundred miles to relieve some other tire, thus its molecules are kept in a livelier state and it has less chance to crack. Try putting rear tires on the front wheels, reversing them as to sides. The strain upon each is different. A constant strain of one kind is weakening. The thrusts that the front wheels receive are not those of the rear wheels. A change will counteract this. The front wheels are "toed in" and as a result the wear is not squarely upon the center of the tread.

Inside patches put in as a result of a blowout should not be left in for any length of time, as these are only emergency repairs. Take them out and have the blown section vulcanized. The patch acts like a piece of foreign matter between the tube and casing and is always chafing, exerting friction and produces heat, which also throws the tire out of balance.

Very often it is the small things that are overlooked that lead to more serious ones. A neglected cut becomes a blow-out. A leaking valve into a flat tire.

The rims should be clean and perfect. The proper style tire for rim and the proper size for the car is essential.

Start or stop gradually, turn corners slowly and keep your garage floor clean from oil and grease. Tighten wheel bearings to prevent wobbling of the wheels. Daily inspection for tread injuries, a liberal treatment of cuts of all sizes with tire dough put in at night and allowed to set until morning. Tires carried on the side or at the rear should be covered. Dust, moisture and sunlight are enemies of rubber.

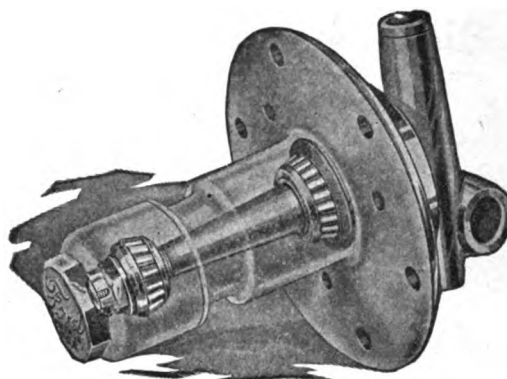
With care and consideration given tires, mileage figures can be stretched to a surprising figure.

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The Wright Taper Roller Bearing for Fords is not "just another Ford accessory." It is a positive necessity to the proper running and safety of your Ford.

Its unique features of "Free Race and Full Series of Rolls" means maximum capacity for performance and wear. They should outlast your car.

DEALERS: If you haven't stocked this necessary, fast-selling Ford bearing, see your jobber at once or write us mentioning his name.



Price, \$10.00 per set
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Fits Chevrolet 490 Also

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Replacements for all Standard types of Bearings

723 N. Broad Street

Philadelphia

MEANING OF ARMATURE REACTION.

Kindly give me information on the terms, "Sweating a Joint" and "Armature Reaction" and oblige.

"Sweating a joint" is practically heating the two parts of the metal with a blow torch together with the solder instead of heating the solder alone.

"Armature reaction" is sometimes used instead of the phrase "counter electromotive force," and is the adjustment which takes place between the load of a motor and the power it consumes, which is brought about by means of the counter electromotive force. This, too, is sometimes called "back voltage," therefore, the voltage, which at any time is forcing a current through a revolving armature, is not the voltage of the line, but the voltage of the line minus the back voltage in the armature. Of course when the armature is standing still there is no back voltage, so the line voltage is free to act, unless a starting resistance is put in series to cut down the current.

INFORMATION ON SHOCK ABSORBERS.

Will you kindly have (S. B. B., Newport, R. I.) in your issue of the Automobile Journal, May 10, name the shock absorbers which he refers to in his letter.

Our correspondent (S. B. B., Newport, R. I.) mentioned Hassler shock absorbers in his letter. He did not mention the name of his car, but from the fact of his using this type of shock absorber, which is designed particularly for the Ford, would judge that his machine was of that make.

The question of riding qualities in a car is one that is often misunderstood by motorists. An automobile listed to carry seven passengers has its spring equipment designed to handle that load and it cannot be expected that it will give the same results with only one, two or possibly three occupants. Motor car springs are necessarily designed to accommodate certain loads and unless these loads are approximated at all times the spring equipment is not working at its maximum efficiency.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

FINDING PROPER FLOAT LEVEL OF CARBURETOR.

(E. E. A., Toledo, O.)

Please inform me by letter or in the Queries Column of the next Automobile Journal how to obtain the proper gasoline level in a carburetor.

As you do not state the make or style of your carburetor, we cannot give you anything but general directions.

If your carburetor has been taken apart, or you have reason to think that it is badly out of adjustment, see that the level of the gasoline in the nozzle is about 1/16 of an inch below the opening. This can be tested by looking at the end of the nozzle with the carburetor taken apart sufficiently to permit this inspection, yet it must be in such condition that gasoline can flow through the regular inlet pipe and through the float valve to shut off the flow at the correct time.

Be very careful in adjusting and tightening the various parts of this assembly, for a carburetor is a delicate instrument and should be treated accordingly.

ADJUSTING CARBURETOR AND CLUTCH OF OVERLAND.

(R. T., Overbrook, Pa.)

I have recently had trouble with my Overland 83. The engine runs smoothly while the car is standing and starts easily, but the car loses power except on second speed. When in high it runs in jerks. Ignition seems all right. Please give me full directions for setting the carburetor and adjusting the clutch.

There is but one adjustment on this model Overland carburetor, that being the low speed adjustment of the gasoline. The air supply is regulated by an automatic valve having two reed springs made of special material and specially designed. There is no adjustment to this air valve, as its operation is entirely automatic.

To adjust the carburetor first have the engine thoroughly warmed up. Then retard the spark and set the throttle so that if the car was in motion the speed would be about 15 miles per hour. Turn the low speed adjustment to the left

or right as needed to give best results. After the adjustment is properly made the valve should be from $1\frac{1}{2}$ to two turns off its seat.

After considerable running the clutch usually begins to "grab," this condition due to the drying out or hardening of the leather. Perhaps a dressing of the lining with neatsfoot oil or castor oil will soften it. The rivets may have worn through and renewal of the rivets is necessary in this case. In tightening the clutch screw down the adjusting nuts upon their studs, but be careful to give each nut the same number of turns to insure an even engagement. If upon engaging the clutch the car gets away slowly, the clutch is slipping and should be tightened further. If the clutch is too tight it will grab and burn the leather. This should be remedied by loosening the nuts an equal number of turns. Keep the clutch rollers and the universal joint well supplied with lubricant. There is an oil hole leading to the ball thrust bearing which is reached with an oil can through the spokes of the clutch. Lubricate this occasionally.

PAIGE

(Continued from Page 61.)

Remove the hot air elbow from over the main air valve, but do not move the high speed screw more than one-eighth of a turn at a time. Turn to the right for a richer mixture and to the left for a leaner mixture, this setting being best for economy. Make sure the mixture is as lean as possible and still obtain good acceleration.

The steering gear is of the semi-irreversible screw and nut type. Lost motion in the gear itself is removed by means of the large nut at the top of the gear housing.

Springs.

There are no adjustments provided on the spring bolts. However, there are removable bushings in the spring ends. The spring bolts are of hardened steel and the bushing of a soft alloy perforated to hold grease to insure proper lubrication.

Should the clearance between the spring shackles and the side of the spring become excessive there would develop a disagreeable rattle. This can be overcome by tightening the nuts on the ends of the spring shackle bolts. This will press the shackle together. In case these are badly worn a thin shim can be placed between the edge of the shackle and the end of the spring. If the rebound clips are loosened or worn, overcome by tightening the bolt which passes through the two ends of this clip.

CADILLAC EIGHT

(For Practises of Overhauling Other Parts not herein given, see General Power Plant Overhaul.)

THE mechanical construction of the Cadillac type 51, built in 1915; type 53-1916, type 55-1917, and the latest type 57, announced for 1918, is practically the same. There have been a few minor changes in sizes, number of clutch plates, etc., but what is true of one type as regards disassembling and replacement is true of all.

For an eight-cylinder V type engine the Cadillac engine is very accessible. Minor operations, such as cleaning out carbon, grinding the valves and cleaning the water jackets, can be accomplished with but few disconnections and removals.

Drain the water from the cooling system by removing the drain plugs from the pump covers and opening the drain cocks in the cylinder blocks. Then turn the shafts, which extend from the thermostat housings on the pumps until the indicators on the end of each shaft point directly down, this will open the valves and allow the water to drain from the engine blocks. The hose connections should then be disconnected from the engine, the radiator unbolted and removed, giving access to the front of the engine.

Getting at Carbon Deposits.

After the secondary wires have been tagged and disconnected from the spark plugs the valve caps should be numbered and removed. On the opposite side of the cylinders from the valve plugs are four water jacket caps, each of which is held in place by a nut, these should be removed, exposing

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YOU would not buy life insurance from a doubtful Insurance Company—then why risk extra wear and wasted power from ordinary greases when you can get from NON-FLUID OIL the best protection for gears and bearings at $\frac{1}{2}\%$ or less per year.

When you buy life insurance you take no chances with a doubtful company—why not apply the same principle to insure your car from wear?

NON-FLUID OIL is acknowledged by leading auto manufacturers to be distinctly superior to common transmission and cup greases. It gives perfect lubrication to bearings and gears—it contains no filler to increase friction like common greases and positively will not melt with heat.

But we saved the best for the last—NON-FLUID OIL actually costs less per month for better lubrication.

NON-FLUID OIL is sold by most dealers—it comes in orange cans. Get "K-00 special" grade for gears. "K-000" for bearings.

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Heed the call of the open. Live outdoors and regain energy and vim so necessary in these strenuous times. Go when and where you like. Stay as long as you please. Enjoy home-cooked meals and clean, comfortable beds—at an expense so slight that a family of four can take a vacation or tour almost as economically as they can stay at home. For a day's outing or a long tour of weeks you can enjoy perfect freedom, independent of anyone or anything.

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A complete home on wheels. Attaches to your motor car and travels along smoothly and without the slightest strain on the car. Set up in 5 to 7 minutes. Provides fully equipped sleeping tent with two wide beds plenty big enough for four. Complete kitchen, Ice Box and Food Compartment. Everything you need for perfect comfort on the road is included. Send today for the "Auto-Kamp" catalog, giving complete description, prices, etc. Don't plan your vacation until you get this book. Write us at once.

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the brass plugs in the top of the cylinders. Upon removal of these plugs the cylinders are exposed, and through the holes in the tops of the cylinders and the holes from which the valve caps were removed the carbon may be scraped from the cylinder heads, the pistons and the valve chambers.

The above paragraph applies to the earlier models, the latest model No. 57 is fitted with removable cylinder heads and when work is being done on this model the heads should be removed for carbon scraping and valve grinding. The water jackets should be cleaned in the same manner as above directed.

The valves are enclosed by plates which are located between the V of the cylinder block. Remove these covers and with a valve lifter compress the springs of the valves. This will lift the valve from its seat and when the valve head is tapped lightly it will be forced downward, releasing the split washer, which is enclosed in the valve spring retaining cap. In replacing the valve spring and valve assembly the valve is first put into place, then the spring is placed over the valve stem with the retaining cap and compressed, the split washer is next fitted with the smallest diameter uppermost around the groove and in the valve stem and the valve spring released, forcing down the retaining cap over the split washer and holding it firmly in place.

The cooling fan, which is held to the generator drive shaft by a castellated nut and two keys, should next be removed, exposing the front part of the engine. Screwed on to each cylinder block by nine cap screws are two cover plates at the front, and two corresponding plates at the rear. These plates should be removed and with a stiff wire the water jackets should be thoroughly scraped free from sediment and rust.

The drain plug should next be removed from the carburetor and the gasoline drained from the float chamber and pipe line. By doing this the pressure in the tank forces considerable gasoline into the carburetor rapidly, having a tendency to clean out the supply line. The gasoline thus drained may be caught in a pail and after being strained through chamois returned to the tank.

Carburetor and Manifold Removed.

The gasoline supply pipe is next disconnected, then the throttle controls. The four tubes which carry the water to the water jacketed intake manifold are then disconnected and the cap screws which fasten the manifold to the blocks removed. The carburetor and manifold may then be removed from the engine.

On type 51 car the tire pump is bolted to the fan bearing housing and should be unbolted and lifted off. On the later models the tire pump is located on the transmission.

The shaft which drives the generator is coupled to the fan drive shaft and generator shaft. The two couplings should be disconnected and the coupling part which is held by a key and nut to the fan drive shaft pulled off.

The timer distributor on the later models is bolted to the rear of the fan shaft housing and should be unbolted and removed, permitting the removal of the rear fan shaft bearing. On type 51 the rear bearing retainer is held on by six studs and nuts. This should be taken off and the bearing removed.

The front fan shaft bearing retainer may be removed with a special tool or pipe wrench and when the bearing is taken out the shaft may be dropped down sufficiently to allow the disconnection of the chain and removal of the shaft.

After the shaft has been taken out the fan shaft housing may be unbolted and removed from the engine. After the wires to the motor generator have been properly tagged and removed the cap screws holding this unit together with the starting switch to the housing should be taken out and the motor generator unit removed from the car.

Removing Units Between the V.

The exhaust manifolds are fitted with five flanges each, four of which are fastened to the cylinder blocks with cap screws, the fifth being bolted to the exhaust line. These should be removed next, leaving the space between the V free and open.

With the exception of the fan shaft assembly none of the units removed from between the V will require repair work upon them. Should either the motor generator or the air

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pump be damaged or worn, they should be returned to the manufacturer for repairs. The gears upon the fan drive shaft are all keyed to the shaft and may be removed with a wheel puller if replacement is necessary. It is important that the fan shaft bearings are both tight and that there is little or no play in the shaft.

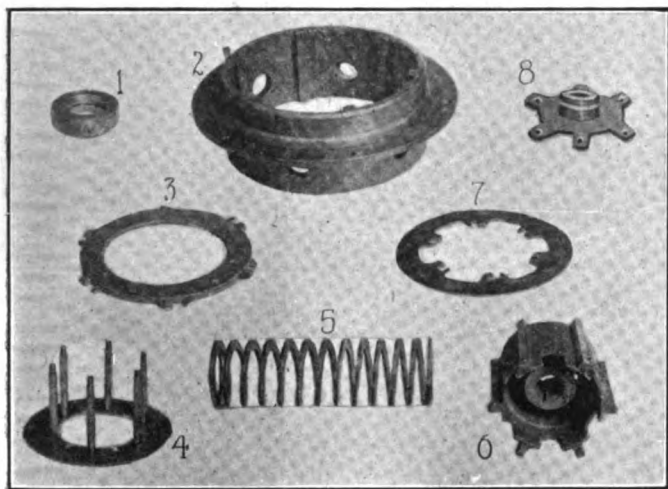
The oil base which forms the lower part of the crank case should next be removed, giving access to the crank case, main bearings and connecting rods. The connecting rods may be removed at this time through the crank case, the bearings and rings examined and replaced if necessary.

Lifting Away Cylinder Blocks.

After the oil pan and pistons have been removed the two cylinder blocks which are fastened to the crank case by nuts and studs should be taken off and examined. To do the lifting a block and tackle should be used, owing to the weight of the cylinder blocks.

A block, box or other supporting arrangement should be placed beneath the transmission housing to keep it from falling and the transmission cover removed. Bolted to the fly-wheel is the large clutch driver casting. The six nuts should be removed, one at a time, by turning on the starting crank so that they will be brought within reach through the hand hole.

The bolts which fasten the transmission bell housing to the crank case should next be removed, as should the bolts at the three suspension points which hold the suspension



Clutch Components: 1, Clutch Release Bearing; 2, Clutch Driver; 3, Drive Disc; 4, Front Plate Retainer with Studs; 5, Clutch Spring; 6, Driver for Driven Discs; 7, Driven Disc; 8, Spider.

brackets to the frame. The engine may then be lifted from the frame.

The oil pump assembly is next removed. Both the inlet and outlet elbows are flanged and fastened to the crank case by cap screws, these screws, together, with the retaining nuts which fasten the oil pump body to the crank case, should be removed and the oil pump with gears taken off. The cover for the front end of crank case with starting crankshaft may next be removed, exposing the timing gears and chain.

Disassembling Rocker Arms.

The plate which holds the rocker arms and valve tappets is next removed from the top of the crank case. This assembly is fastened by studs to the crank case. The rocker arms are held in place by four shafts, which are pinned into the casting. The rollers should be given a careful examination and if worn out of round or loose on the pins, removed and replaced with new. The pins also should be replaced if worn.

Both the camshaft and fan driving chain should be removed next. Cut off the riveted head of one of the seat pins of the camshaft chain and remove the seat pin and rocker pin. The chain may then be removed. Since the fan shaft has been removed enough slack is left in the chain so that it may be taken off without cutting the chain.

All of the gears on the crankshaft and camshaft are keyed to the shafts and may be removed with a wheel puller. To

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We will send to any part of the U. S. express paid one or more cases of Panvar for \$12.00 for 12 quarts, case containing 12 free samples and advertising matter—order through your jobber—if he cannot supply you order direct.

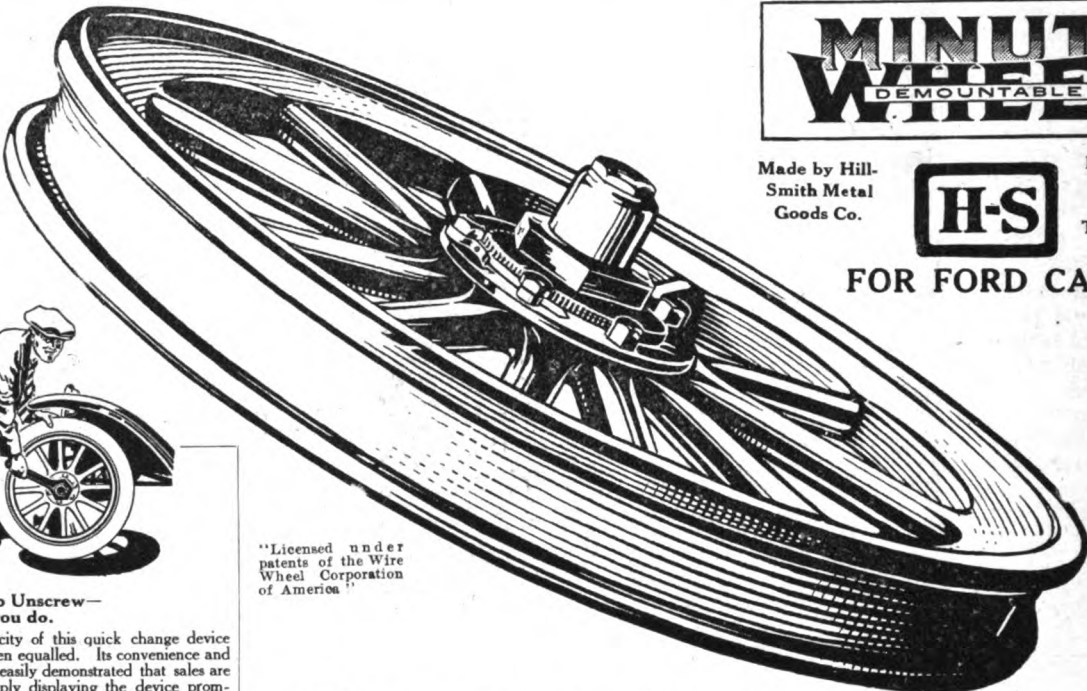
PANVAR—is not a paint—but a quick applying transparent liquid that will make **DULL LOOKING CARS** bright as new, dries hard over night. A quart will do a car.

CONSUMERS—If your dealer cannot supply you, send \$1.50 and we will send parcel postage paid.

The PANVAR CO. 618 Bulletin Building
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Name.....

Address.....




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DEMOUNTABLE

Made by Hill-Smith Metal Goods Co.

Backed by the H-S Quality Trade-Mark

H-S

FOR FORD CARS



**One Nut to Unscrew—
that's all you do.**

The simplicity of this quick change device has never been equalled. Its convenience and comfort is so easily demonstrated that sales are made by simply displaying the device prominently where Ford owners can see it.

**Retail price, \$30.00
Denver and West, \$35.00**

Write for Dealers' Prices and Literature to Department S.

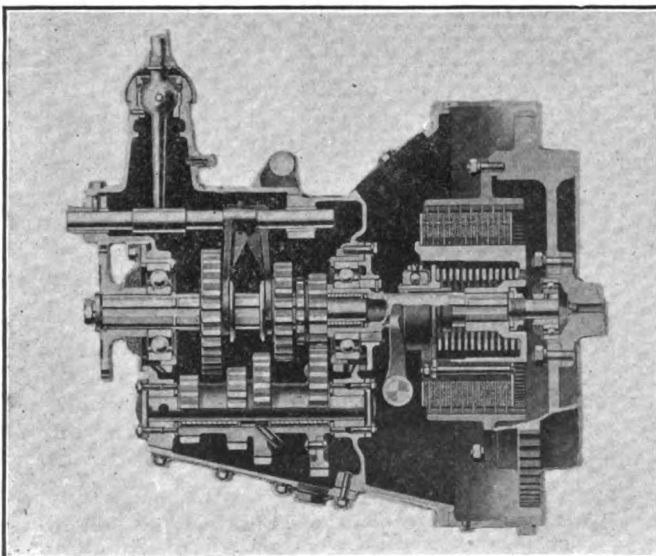
HILL-SMITH METAL GOODS COMPANY
82 Brookline Ave. :: Boston, Mass

Manufacturers of motor parts and accessory—repair parts for Overland and Ford cars.

"Licensed under patents of the Wire Wheel Corporation of America"

*The most profitable accessory of the year.
One sale means a dozen more.*

remove the crankshaft, first unbolt and pull off the flywheel. This member is fitted to the crankshaft flange and held by nuts and dowels. After it has been removed the rear crankshaft bearing is exposed. The screws which fasten the bearing housing to the crank case are first removed, then the bolts which fasten the halves together are taken out. The hous-



Cross Section of Gearset and Clutch.

ing and bearing may be taken from the shaft and crank case. When all of the main bearing caps have been taken off the crankshaft may be removed.

The camshaft is mounted on three bearings, each of which is held in place by a set screw. Unless replacement is necessary, only the front bearing need be driven out to release the camshaft. With the front camshaft bearing removed the

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camshaft may be drawn out from the front of the case.

Beyond the renewal of packings the water pumps require but little attention. These two units are bolted to the front of the engine, each by two cap screws, and may be removed very easily for cleaning.

Cleaning the Oiling System.

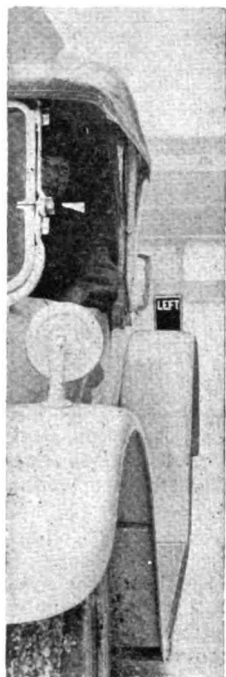
The oiling system of the Cadillac car is force feed throughout and considerable time should be spent in giving it a thorough cleaning. All of the feed tubes leading from the pump and to the camshaft bearings should be flushed out with kerosene or gasoline. A good device for cleaning the oil tubes may be made from a tire pump and rubber tube; air pressure forced through the passages that cannot be reached by a stiff wire has a tendency to drive off the foreign particles of dirt. The ducts in the crankshaft should also be cleaned in the same manner.

In the rear end of the crankshaft will be found a ball bearing upon which the clutch shaft revolves. This bearing should be examined and replaced if it shows signs of wear. The clutch assembly may be removed from the housing in two parts. The big containing drum or driving drum that was fastened to the flywheel may be slipped from the driving discs, then the nut on the end of the clutch shaft removed and the clutch assembly pulled from the shaft with a wheel puller.

Since the spring tension is very great, the clutch unit cannot be disassembled or assembled without special apparatus or tools. To remove the six nuts on the end of the front plate retainer with studs (illustrated) would result in a flying to pieces of the clutch unit, causing injury to the person doing the work. A handy clutch removing tool may be made as follows:

Special Tool for Working on Clutch Unit.

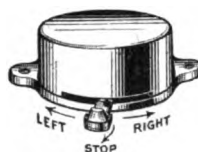
Obtain a bolt about 15 inches long and about one inch in diameter, or just large enough to slip easily into the hole through the center of the clutch unit. Over the bolt and against the head place a large iron washer, then slip the bolt



Front View



Its use on just one occasion to avert collision and death will prove how absolutely essential the SMITH AUTO SIGNAL is.



"He knows which way you are going"

SMITH AUTO SIGNAL

The Signal is placed only on the left rear fender and shows the words LEFT, RIGHT or STOP in red, two sides—both from and rear, day and night.

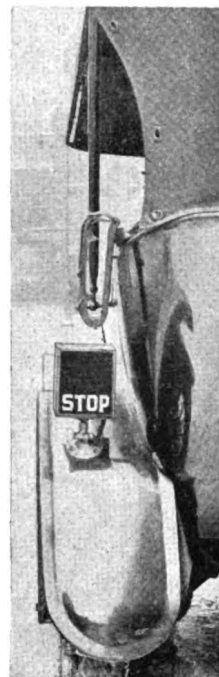
The SMITH AUTO SIGNAL standardizes signaling. It also provides the best and cheapest insurance obtainable for both you and your car. It **prevents** the accident. Operates from plainly marked, single-handle, three-way switch.

Simply constructed—nothing to get out of order. Easily installed, direction with every signal. Already used on half the makes of cars. Light in weight, compact, ornamental as well as serviceable.

There are fifteen reasons and more why you should use the SMITH AUTO SIGNAL. Write us for further particulars. No obligation on your part and it may save your life.

SMITH SIGNAL CORPORATION, Manufacturers
WEISS & SINCLAIR, U. S. Distributors
53-55 West 66th Street New York

(Dealers write for territory)



Rear View

through the hole with the washer against the front part of the driver casting (see illustration).

Over the end of the bolt place another washer, large enough to press against the clutch spider upon which is mounted the ball release bearing. Then screw the nut on to the bolt until the pressure contracts the spring and releases the clutch discs. The nuts on the end of the studs of the front plate retainer may then be removed and the nut on the big bolt backed off.

The ball release bearing is retained on the clutch spider by a spring split ring, which may be pried off with a screw driver if necessary. In assembling the clutch it is a good plan to put the discs in place inside the large driving flange, leaving them there until the large bolt has been loosened and the clutch plates locked together by the spring pressure.

Work on Transmission Members.

After the control rods have been disconnected the transmission cover upon which is mounted the gear change lever may be taken off. The six bolts which fasten the universal joint to the transmission shaft are next taken out, releasing the transmission, which may then be removed from the car.

If the car is of the later models the tire pump should be removed at this point. The two ball bearing races upon which the transmission main shaft is mounted are retained by caps, which are fastened by cap screws. These caps should be removed and the outer ball races driven out of the housing from the inside. With the bearings removed the main and clutch shaft with gear attached may be taken from the gearset.

The countershaft is held in place by a cap on each end, directly beneath the main shaft, and when removed the gears, together with the roller bearings, may be taken from the housing.

The rear axle, together with the differential and drive shaft, may be removed, without disturbing the housing or wheels. First remove the wheel hubs exposing the axles which drive through spiders and may be drawn from the car.

The flange which attaches the drive shaft housing to the rear axle housing should next be removed, bringing with it

the drive shaft, universal joints and differential assembly.

After the rear universal joint has been disassembled and the nut removed from the pinion gear shaft, the universal joint flange may be pulled from the pinion shaft. The front roller bearing is fastened into place by a cover plate, which may be removed and the bearing taken out for examination.

Carburetor Adjustments.

The carburetors on all of the models are practically the same and have but one adjustment for running, that being the air valve screw. With the engine running and the manifold heated the air valve screw should be so adjusted as to give the best results at throttled down and normal speeds. If the carburetor has been disassembled for cleaning the float should be adjusted so that the distance between the carburetor body and the top of the float is $\frac{3}{8}$ of an inch on type 51 and $\frac{1}{2}$ inch on types 53, 55 and 57. This measurement may be taken with the carburetor upside down and the float chamber removed. The float arm may be bent so that the float is the proper distance from the body. The plunger device, which is actuated by the throttle lever, is designed to force gasoline through the needle valve upon quick acceleration and the top of the rod should be flush with the arm.

At high engine speeds on the later carburetors a cover is attached to the throttle lever, which covers or uncovers a slot in the throttle body, through which is admitted extra air. This cover should begin to uncover the slot at approximately a half open throttle position.

Before setting the valve clearance (distance between valve stem and tappet) the valve which is being adjusted must be brought into a certain position. Turn the engine over with the hand crank until the valve which is being adjusted has just seated and the tappet has dropped away from the valve stem. The valve clearance should be from .002 to .003 when the engine is cold.

Both the camshaft driving sprockets are marked and should be replaced as follows: One tooth of the camshaft driven sprocket is marked with an arrow and the tooth diametrically opposite with an O. A tooth on the crankshaft sprocket has a similar arrow upon it and the two teeth op-

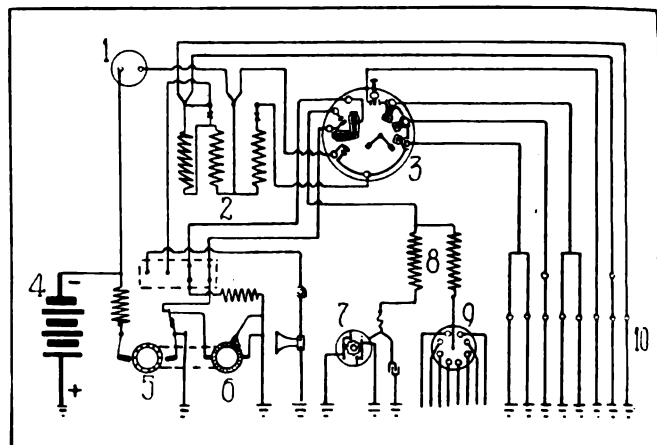
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**NEW DEPARTURE
BALL BEARINGS**



Strength
Stamina
Service

The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensee



Cadillac Wiring Diagram: 1, Ammeter; 2, Circuit Breakers; 3, Combination Switch; 4, Battery; 5, Motor; 6, Generator; 7, Timer Contacts; 8, Ignition Coil; 9, Distributor; 10, Lighting Lines.



**ZENITH
CARBURETOR**

KNOWN the world over as the zenith of carburetor efficiency. A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.
New York Detroit, U.S.A. Chicago

posite each have an O mark.

Turn the camshaft and crankshaft to bring the sprockets with the arrows pointing toward each other as illustrated, and with the O mark on the camshaft sprocket opposite a point between the O marks on the crankshaft sprocket. Then put on the chain. In replacing the camshaft chain, as well as the fan drive chain, care must be used to see that the chain is so placed on the sprockets that the arrows, which are stamped on the outside links, point in the direction in which the chain is to run.

STEWART TIRE PUMP ON COLE "3."

(F. S. J., Boston, Mass.)

Would appreciate reading a description of the Stewart tire pump that is attached to the Cole "8" in the Queries Column of the Automobile Journal. How fast should the pump revolve and how is it lubricated?

Throw over the lever on the floorboard with the foot and the pump will instantly go into action. The gauge will denote sufficient inflation and the pump is thrown out of action by reversing the lever.

The base of the pump is made of aluminum. The piston is steel, hardened, ground and lapped. The connecting rod is hardened steel. The cylinder finely machined, air cooled with fins to insure perfect cooling. There are no leather or rubber packings to wear or cause leakage. When in operation it will fill a 36 by 4½-inch tire in less than five minutes. All the air pumped into the tire is screened and protected with a double ball valve so that should dirt hold one of the valves open the other valve is sure to act.

The bore is 17/16 inches, stroke 2½ inches, the length of the piston is 1¾ inches, making an extra long bearing, this being fitted with oil conductors to insure correct lubrication. The piston rubs against oil soaked wicks, which supply every bit of oil needed and yet prevent oil from getting into the cylinder. The wick projects outside, where oil is dropped upon it through two small oilers. The crankshaft is provided with a separate oiler, as is the connecting rod.

When inflating the tire note that the air pressure gauge is not attached to the rubber connecting hose in the middle, but that it is nearer one end than the other. Never attach the shorter end to the pump or the tube connection valves will be injured. Do not throw the gears in mesh when the engine is running. Stop the engine, shift the pump lever and start the engine slowly, at about the same number of revolutions that it would be turning if the car was going at the rate of five miles an hour with gears in high, which is the ideal speed for the pump to operate.

The pump is mounted on the left side of the engine at the rear and the air hose and gauge are stowed away under the driver's seat, where it is available for instant use. After using the hose should be carefully coiled to avoid kinks and the gauge wrapped in some soft material to avoid accidental scratching.



Ask For The Best Wrench

Your dealer will show you just the size you need for your tool kit, or for repair work.

He will recommend the COES wrenches as all good dealers have done for fifty years.

Coes Wrenches do not break, or wear out in service life, they cost less than any other tool made.

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WORCESTER, MASS.



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The highest quality lowest priced lamp produced

LIST PRICE	With Mirror	\$6.00
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Sold by all dealers

CULVER-STEARN'S MFG. CO., Worcester, Mass.
Detroit, Mich.

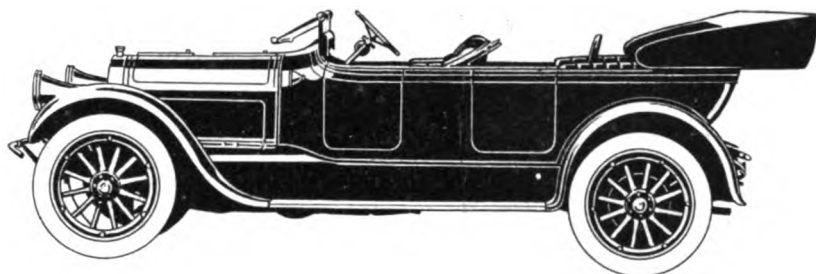
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It is a well-known fact that Paige Dealers are among the biggest money makers in the motor car field. An inspection of the Paige line will explain why.

Write for complete particulars

PAIGE-DETROIT MOTOR CAR CO., Detroit, Mich.

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This Pierce-Arrow Touring Car seats comfortably five or seven passengers including the driver. It is 6-cylinder, 48 horsepower and 142 inches wheel-base. There is a passage between the two front seats, and the auxiliary seats are the disappearing kind.

Pierce-Arrow

The initial service rendered by a Pierce-Arrow Car is great; the upkeep low as measured by the service rendered, and the service long. It is the car of ultimate economy.

THE PIERCE-ARROW MOTOR CAR CO.
BUFFALO, N. Y.

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ALL
STEEL

WRENCHES
AND TOOLS

Why Your Customers Want Them

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Persistent advertising to all classes of wrench and tool users makes Mossberg Tools constantly called for. In so much as the Mossberg line includes so many specialties in adjustable, socket, single and double-end wrenches, made particularly for "the places hard to get at," there is a model for every need or requirement.



MOSSBERG
DEPENDABLE TOOLS



Series
"K"
Adjust-
able
Wrench

are to be consistently called to the attention of your customers in such publications as Saturday Evening Post, Literary Digest, Hardware Age, Hardware & Metal, Motor World, Motor Boat, Implement and Tractor, Commercial Car Journal, Motorcycling and Bicycling, Motorcycle and Bicycle Illustrated, Automobile Trade Directory and American Exporter, reaching every class of possible customers for Mossberg Tools.

You will get the full benefit from our national advertising by letting your customers know that you are the Mossberg dealer for whom they are looking, and incidentally get quick turnovers—a number of them. Use our free dealer helps to do this.

We have an interesting story to tell you on the Mossberg proposition, and how it will bring an increasing number of satisfied customers to your store.

"Our simple sales policy is to deserve your business."

Send for 201-E descriptive catalogue.



No. 14 Socket Wrench Set

FRANK MOSSBERG COMPANY
Wrenchsmiths for Twenty Years ATTLEBORO, MASS.

AUTOMOBILE JOURNAL

DEVOTED TO

OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS

VOL. LXV.

PAWTUCKET, R. I., JUNE 10, 1918.

NO. 9.

CONSERVATION

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YOU MUST SAVE MORE

Through greater efficiency, system and organization.

The AUTOMOBILE JOURNAL

Is to be devoted intensively to CONSERVATION—to a far greater degree than ever before. Beginning with the June 25 issue it will be largely given over to articles that will emphasize the great need of and the possibilities for economies by Industry, Commerce and Individual, particularly directed to Motorists and Owners and Users of Automobile Vehicles.

These articles will be prepared by specialists who have carefully studied CONSERVATION. They will deal with practicalities. They will be authoritative.

The primary object is to show how economies of TIME, LABOR and MONEY can be obtained in Industry, in Business and in every use of motor cars.

The June 25th edition will have a distribution of 25,000 copies. It will deal specifically with economic values of Accessories, Parts, Fittings and Supplies, from the viewpoints of the Motor Vehicle and Allied Industries, the Trade and the Owner.

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ADVERTISING DIVISION
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The empty can makes a fine reserve oil carrier.

Prices: 1/4-gallon \$1.00; 1/2-gallon \$1.50
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Delivered free upon receipt of price if no dealer in your city can supply you.

Special Proposition to Dealers and Distributors

Get Pontoklene in stock quick—before the road tar season starts. We will help you introduce it. After that it sells itself. Write us today.

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Owned and operated by

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- 3rd. A Big New England Advertising Campaign.
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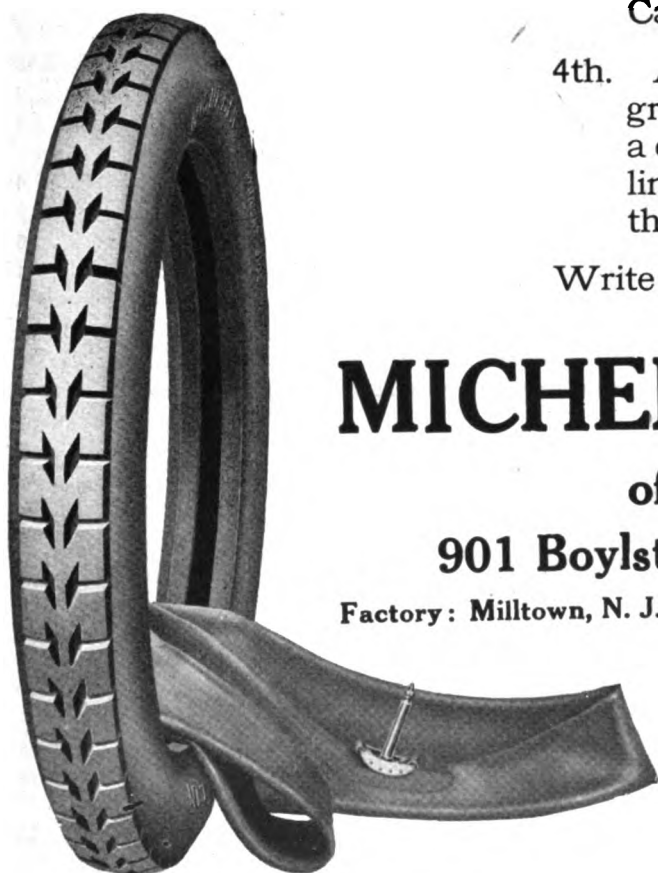
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AUTOMOBILE JOURNAL

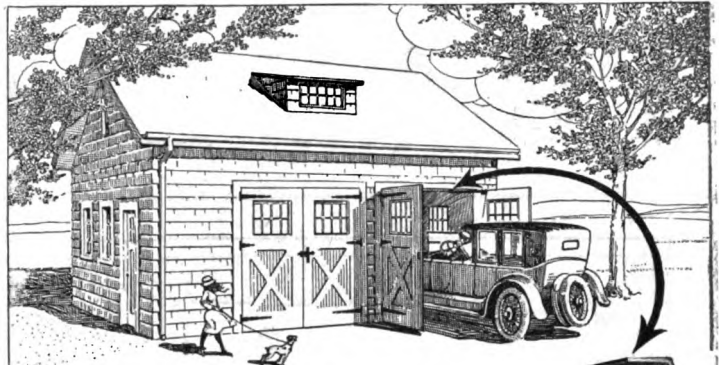
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Stanley Garage Door Holder

THE doors in this picture are swung on Stanley Garage Hinges, No. 1457, 24 inch at the top and bottom and 10 inch in the center. They are held open with The Stanley Garage Door Holder No. 1774 and equipped with a Stanley Garage Door Latch No. 1264.

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YOU may get your car in or out of the garage before the wind slams a heavy door on it—but is the chance worth the cost of replacing a lamp or straightening a fender if the wind should beat you to it?

The Stanley Garage Door Holder

insures you against just such expensive accidents. It is an arm of steel which locks your garage door open, preventing it from slamming into and smashing your car.

The Stanley Holder operates automatically. Push your garage door open; the holder catches and locks it at a little more than a right angle. To unlock the holder and close the door you have only to pull on the chain. You can do this while standing inside your garage.

It always works. The Stanley Garage Door Holder is a mechanical footman which never gets tired and never forgets. It may be applied to old or new doors of any size or shape. This holder is only one item of the Stanley Garage Hardware line, which includes Garage Hinges, Bolts, Latches and Pulls—all especially designed for garage use. In fact it is a line of complete hardware equipment for your garage.

Stanley Garage Hardware is carried in stock by the leading builders' hardware dealers everywhere. A booklet fully describing and illustrating the complete line will be sent you on request. If you own or are planning to build a garage you will want this interesting booklet. Send for your copy.

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New Britain,

Conn., U. S. A.

New York

Chicago

100 Lafayette Street

73 East Lake Street

Manufacturers of Wrought Bronze and Wrought Steel Hinges and Butts of all kinds, including Stanley Ball Bearing Butts. Also Pulls, Brackets, Chest Handles, Peerless Storm Sash Hangers and Fasteners; Screen Window and Blind Trimmings; Furniture Hardware; Twinrold Box Strapping and Cold Rolled Strip Steel.

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All surface cars and Fifth
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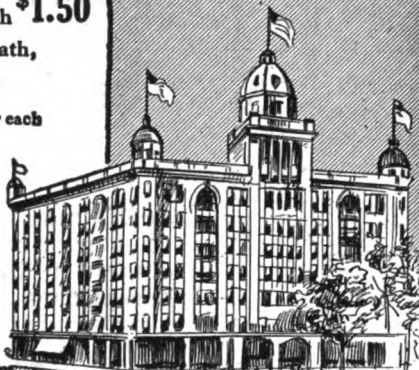
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33x4	16.85	19.00
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The tread of any tire may be worn
clear through, but if the inner fabric
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Size	Tires	Size	Tires
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30x3	.. 3.00 up	35x4 1/2	.. 8.00 up
30x3 1/2	.. 3.75 up	36x4	.. 7.75 up
31x4	.. 5.00 up	36x4 1/2	.. 8.00 up
32x2 1/2	.. 5.00 up	37x4 1/2	.. 8.00 up
32x4	.. 6.50 up	35x5	.. 8.50 up
33x4	.. 6.50 up	36x5	.. 9.00 up
34x4	.. 6.50 up	37x5	.. 9.00 up

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30x3	8.25	1.50
30x3 1/2	10.75	2.60
32x3 1/2, Firestone.....	11.50	2.60
31x4	16.75	3.40
32x4	17.25	3.45
33x4	18.00	3.50
34x4	18.25	3.60
36x4	19.25	3.85
34x4 1/2	24.00	4.00
35x4 1/2	25.00	4.50
36x4 1/2	25.25	4.75
37x4 1/2	26.50	4.85
35x5	27.00	5.25
37x5	28.00	5.85

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32x3 1/2 ...\$4.85	35x4 1/2 ... \$9.00
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THE AUTOMOBILE JOURNAL

VOL. LXV.

PAWTUCKET, R. I., JUNE 10, 1918.

NO. 9.

Giving Motor Cars the Final Road Test in Driveaways

Scarcity of Freight Cars and Congestion of Railroads Is the Abnormal Condition Relieved by Driveaways—The Practise Will Divert 80,000 Freight Cars to Urgent War Shipments

THE driveaways of motor cars from factories are the order of delivering cars during these stressful war times. Americans are equal in every phase of their customarily active lives to the necessities of these exacting times. The exigency of increasing the nation's mobile forces has been and is being met on every hand with methods and means by which all seeming difficulties are being overcome. One of the inconveniences of continuing the motor life of the nation is the congested condition of the railroads, which is counteracted upon by the absolute necessity of first carrying over the railroads the government's enormous shipments of war materials and munitions, food and fuel. Nevertheless, every patriotic American motor car manufacturer, dealer and motorist will stand aside and waive his own personal convenience to accommodate his government and to do his little "bit" toward winning the war.

The manufacturers of and dealers in motor cars are relieving railroad freight congestion by delivering new cars under their own power instead of shipping them by rail. Thirty-three per cent. of the production of eight of the larger motor car factories was delivered over the highways during the first three months of this year. The number of machines driven away in that period was 38,900, which relieved the railroads of about 10,000 freight cars. With a prob-

able production of 1,000,000 motor vehicles this year, the total saving in railroad cars by this practise will amount to about 80,000 freight cars.

Inter-State Licenses Interfere.

No dealer has been able to secure in advance any number of cars to hold in storage for future deliveries. The freight tie ups starting last November, followed immediately by the fuel shortage and the scarcity of food stuffs and other goods, started a condition in transportation which motor cars and motor trucks ever since have been used to relieve.

the driveaway "strings" shall carry a state license plate, and sometimes that each driver shall have a state operator's license. Owing to lack of uniformity in the state motor vehicle laws full compliance with requirements in one state is not held to be sufficient in some of the other states and much delay, annoyance and additional expense were needlessly experienced.

The N. A. C. C. has taken this matter up with the director-general of railroads, with the secretary of war, as chairman of the Council of National Defense, and

with the secretary of commerce as a member of the council. It is also preparing a definite plan to offer to the governors whereby motor vehicles in transit may be allowed to proceed to destination without interference over the question of licenses.

When the motor vehicle laws were enacted no such shipping situation as now exists was foreseen and no provision was made for delivery of motor cars by highway. The purpose of license plates is to

identify the car and its ownership in case of accident or infraction of operating regulations, and where a string of driveaway cars remains together and the cars carry improvised duplicates of the manufacturer's or dealer's license plate, such identification is sufficiently established for this purpose.

Many manufacturers and dealers are urging the enactment by Congress of a



Militant Women of the Women's National Army, New Jersey Division, Who Drove Chandler Cars from Cleveland to New York City.

Governors of the different states, who are in all cases at the head of the various state councils of defense, were asked by the National Automobile Chamber of Commerce to request local authorities not to interfere with the overland delivery of new automobiles and motor trucks from the factories to dealers.

Considerable trouble has been caused by local officials, who insist every car in

Federal license law which will sweep away the lack of uniformity in the state laws that are now interfering with this form of interstate commerce.

The Expense of Driveaways.

The cost of driving cars from factories in Michigan varies slightly, but in general may be placed at between \$110 and \$115 per car on the average. Where no trouble is experienced, such as smash ups, etc., the cost may be considerably lower if the roads are good and the time reduced to the minimum. Generally it takes an average of about seven days from either Flint or Lansing, Mich., to New York City, although, in some cases, 10 days are required. From Detroit dealers usually allow six days, and from Buffalo, five days.

The Oldsmobile company of New York City kept a careful account of all expenses connected with driving the last convoy of 50 cars from the factory in Lansing, Mich. According to the statement given below it may be seen that quite a little damage was done to paint and varnish en route:

Gasoline and oil.....	\$990.81
Fifty men, at \$3.60 per day, nine days coming and one day returning.....	1,800.00
Expenses, 50 men at \$2.50 per day.....	1,250.00
Railroad fare, 50 men at \$15.28 each.....	766.50
Ferry and other tolls.....	89.40
Licenses.....	350.00
Expense, man to York, Pa., with licenses.....	20.00
Twelve damaged fenders.....	150.00
Touching up and varnishing 18 cars at \$20.....	260.00
Nine splash pans.....	18.00
Washing and polishing 50 cars..	50.00
Dent in back, two mud guards and refinishing one car.....	65.00
Total.....	\$5,709.71
Average delivery cost, per car....	\$114.20.

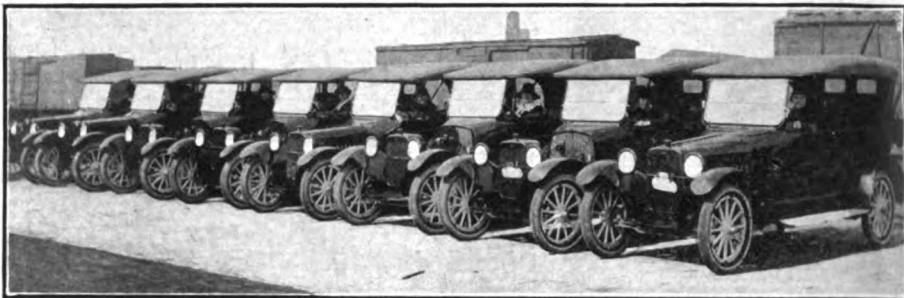
Driveaways in Small Groups.

The Buick Motor Co. has found it bad practise to start a convoy of 30 or 40 cars off at once. This frequently causes congestion on the roads and when small towns are reached for noon or night stops there are insufficient facilities for boarding the men and caring for the cars. Furthermore, the men are likely

to skylark at night and this means a late start the next morning when early starts are imperative if schedules are to be maintained. The best plan has been found to send cars away in groups of five each. Each group is sent away perhaps an hour after the preceding one. This eliminates the congestion on the

of the hundreds of United States Army trucks which travel to the seaboard under their own power.

"When it is recalled that this achievement was made in the depth of a very severe winter, with the roads frequently choked by drifting snow, the feat reflects credit on the drivers, the dealers



Women Drivers of Saxon Motor Corp., Who Accepted Duty to Help Government.

roads and at the ferries, gives the small town restaurant a better chance to feed all the men and separates the drivers into small groups that are more likely to go to bed at the proper hour.

New York City dealers in some cases pick up their drivers in the city and pay their railroad fare to the factory. Little trouble has been experienced in securing good men. One driver, however, who was accustomed to another make of car, drove a Buick 300 miles in second gear at about 30 miles per hour and burned out the connecting rod bearings. Some of the companies are relaying their drivers, one squad staying with the cars for a certain stretch of the distance; then they are relieved by another squad and return to the factory.

Packard Trains of Driveaways.

More than 12 per cent. of its cars and 21 per cent. of its truck deliveries between Dec. 1 and April 1 have been made by the Packard Motor Car Co. to its branches and dealers via the drive-away method. These percentages represent either so much relief to the railroads during this period or just so much more business which could not have been done if the driveaway had not been adopted. These figures take no account

taking factory delivery, and the vehicles that made the run," said George R. Bury, assistant general sales manager of the Packard. "In some instances trains of nine Twin Sixes and 30 trucks traveled 570 miles over wintry roads."

One of the best shipping days the Packard had was Saturday, March 23, when cars and trucks valued at nearly \$400,000 left the factory. Part of these were driven away under their own power and the remainder were shipped by rail.

Saxon Has Women Drivers.

To release skilled mechanics for other work and thus give some help in the war, there are seven girls at the Saxon Motor Car Corporation's factory in Detroit whose daily tasks consist in driving newly finished cars from the factory to the shipping dock.

And the girls won't trade jobs now for any of the purely feminine pursuits. They get greasy and dirty—they have had to throw away chamolis and powder puffs because they are futile—but still they like the job and they all say they would not trade it for a place at the kitchen sink or on the firing end of a sewing machine.

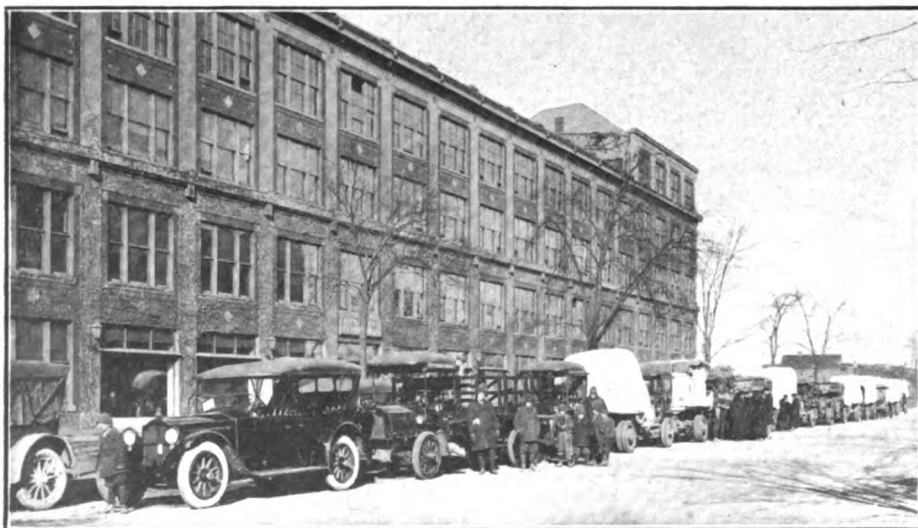
"It's a much better job than being a department store detective" says Mrs. Lotta Dupuis, who formerly tripped shop lifters and sneak thieves in a downtown store. "Of course it isn't so dressy, but it's healthier and I like it better. Also I can make more money for the support of my three kiddies."

Mrs. Wanda Ludeman backs up Mrs. Dupuis. She formerly was a government operative in rounding up violators of the Harrison anti-narcotic law.

"I took the job because I wanted to help the government, and every woman who does a man's work releases a man for the firing line," said Mrs. Ludeman.

The other girl motor drivers are Miss Asa Alvis, Miss Addie Murphy, Miss Regina Anikowski, Miss Verna Otto and Miss Florence Hill.

The Saxon Motor Car Corporation has provided the women workers with a rest room in the factory, equipped with easy chairs and a lounge where the drivers



Packard Driveaway Train Includes Trucks Loaded with Packard Passenger Cars.

can eat their lunches and also put in spare minutes. Here they knit when they are not driving.

The factory foreman in charge of the drivers says they do just as well as men. Of course their only job is driving—a thing every up-to-date woman of today can do well. The cars are completely

Gibson, Original Driveaway Dealer.

C. B. Gibson, president of the Gibson Automobile Co. of Indianapolis, claims to have originated the idea of the driveaway. His company is the distributor of Overland and Willys-Knight cars in Indiana and Eastern Illinois. The Gibson Co. inaugurated its first driveaway in

driving their cars in the open country.

Professional Men in Driveaway.

The Dodge car dealer in Savannah, Ga., recently had occasion to drive a considerable number of cars from the factory in Detroit to Savannah. He let it be known to a friend or two that he would pay a man \$75 to go to Detroit and drive an automobile to Savannah, the driver to bear whatever expense he contracted over and above \$75. The offer got around; the newspapers printed it and the dealer was overwhelmed with acceptances.

The men who finally were selected to make up the driving party included a college student, whose father took him out of school to make the trip, several grocers, the city court sheriff, a wholesale grain dealer, a commission merchant, an insurance man, a lumber dealer, a physician and several mechanics.

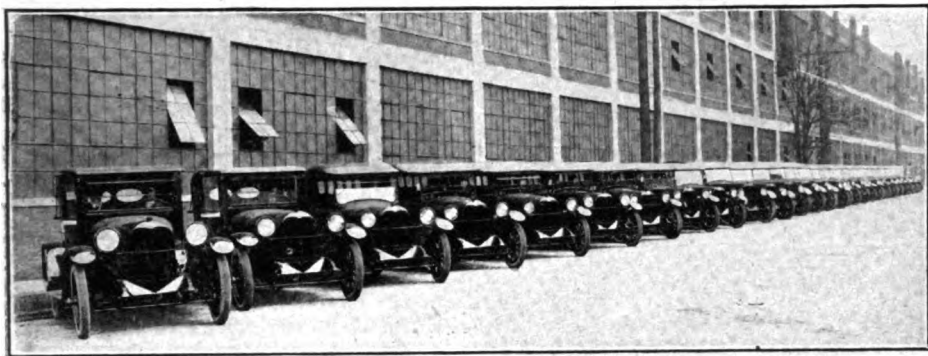
The party of 24—several of the men being accompanied by their wives—started away from Detroit in 17 Dodge Brothers motor cars. It was expected that the driveaway would arrive in Savannah in seven days. The route was by way of Toledo, Dayton, Cincinnati, Louisville, Ky.; Nashville, Tenn.; Huntsville, Ala., and Atlanta, Ga. The dealer's plan operated so successfully that he expects to use it again and again in future driveaways.

1472 Chevrolets Go Over Road.

Chevrolet dealers in eight states conducted driveaways from the factory in Flint, Mich., and a total of 1472 cars were delivered in this way from Jan. 1 to April 1. This large number of driveaway deliveries was divided among the eight states as follows: Driveaways to Ohio towns and cities, 605; to Kentucky, 47; to Illinois, 113; to Wisconsin, 76; to Pennsylvania, 23; to Indiana, 340; to Michigan, 246; to West Virginia, 22.

Oldsmobiles in Driveaways.

Like every other manufacturer of motor cars, the Olds Motor Works, Lansing, Mich., must depend upon distributors, dealers and prospective users to drive their cars from the factory to Lansing. At this factory everything possible has



Forty Paige Cars Start for Pittsburgh.

finished before the women see them.

The foreman was asked: How do the men take to the competition of the women? "The drivers report that the men treat them respectfully and help them in every possible way." And what view of the innovation do the girls in the factory office take? "They are envious. Several of them want to quit their jobs and get into the driving positions."

The girls filling the driving positions say that they eat up their extra money now, as working outdoors gives them ravenous appetites.

Militant Women Drivers.

Among organizations of patriotic American women, now doing duty to help in the war, is the "Women's National Army," whose members are divided into regulation units similar to our regular army, and training twice weekly is strictly carried out. The government has permitted the use of regulation United States Army uniforms and a majority of the members now wear them.

A particularly active branch of this service is the Motor Unit, members of the unit being expected to drive and care for ambulances, trucks and passenger cars wherever needed to release men for other work or for overseas service. Hearing recently of the frequent driveaways of Chandler cars from Cleveland to New York, by the Brady-Murray Motors Corporation, New York City Chandler distributors, five motor unit members of the Women's National Army—New Jersey section—volunteered to pilot as many Chandlers in the big driveaway which was scheduled for April 25th. Accordingly the five young women, headed by Captain Josephine Windell, took an active part in the Cleveland-New York drive of over 600 miles, which left the Chandler factory on that date.

Captain Windell stated that they did not volunteer for this service "just for the fun of it," but because they wanted to avail themselves of the experience to be gained and, too, in order to release an equal number of men for other important work.

May, 1914, and the movement has been popular ever since with the Willys-Knight dealers.

The first week in February 500 cars were driven away from the factory, which is 50 per cent. of the total driveaways for the whole month of February last year, which totaled 1000. Of the 500 cars in driveaways in February, 150 of them were driven away by 150 Gibson "raiders."

March 12th the Gibson "raiders" arrived at the factory in a train of 10 coaches, accompanied by a "jazz" band, and drove away 212 cars.

Driveaways Popular with Paige Dealers.

Driveaways by Paige dealers have become ordinary hourly events at the Paige factory in Detroit, but the most unique spectacle is that of Paige owners who go to the factory to get their own cars and drive them home. The Paige owners' parties go to Detroit, wait for their cars and start out in long processions for Utica, N. Y., or Des Moines, Ia., or other points, thus saving the cost of paying to the dealer the expenses of drivers and also eliminating the customary freight shipment charge, besides securing a good outing and the experience of



Driveaway Crew of the Dodge Brothers.

been done to facilitate shipping. Ways have been devised that increase the carrying capacity of freight cars, as, for instance, the loading upon a flat car two cars on the level and at the other end tilting a third car with its front wheels resting over the front of the second car and supported at this angle by a staunch-

der the guidance and supervision of the dealers' service men, so that by the time the owner arrives home he will have learned how to properly shift his gears and how to gently engage his clutch instead of jamming or jerking it, which strains the whole power transmission, including everything from engine back to

it cannot be used for a Buffalo shipment, which is a stop nearer Detroit than Rochester.

"In consequence of this situation, it means that automobiles to a very large extent have to be delivered this year under their own power. A certain number of cars have been delivered in this manner for the past two months. Now that road conditions are improving, arrangements must be made for handling an even larger number of cars in that way. Trains of automobiles leave Detroit and other automobile producing centers every day. They go to destinations along the Atlantic seaboard and in some instances as far west as the Missouri river. We have already sent cars overland to such points as Atlanta, Columbia, S. C., Baltimore and Fall River, Mass. Daily driveaways are made to nearby points. A train of SuperSixes leaves every day for Cleveland."

O. R. Houser, wholesale manager for J. W. Goldsmith, Jr., Atlanta, Ga., early in the spring conducted a driveaway of 15 Hudson cars from the factory in Detroit to the southern city. Leaving Detroit on a Wednesday afternoon the first section of the drive was completed by arriving in Cincinnati, Thursday night, a distance of 268 miles, without a scratch or puncture.

Women in Reo Driveaway to Georgia.

With all the "pep" and enthusiasm of young ladies entering upon their first year at the training school, nine ladies, members of the Motor Unit of the National League for Woman's Service, Atlanta division, under the command of Capt. Harrington, arrived in Lansing, April 1st for the purpose of driving to Atlanta, Ga., an equal number of Reo speed wagons. This and all other divisions of the league are under the control of the State Guard of which they are a part. These divisions are also subject to the call of the President. Only on a special order from Washington the squad was permitted to come to Lansing



Atlanta, Ga., Women, Members of League for Woman's Service, Drove This Train of Reo Speed Wagons to Atlanta.

ly braced stand and its rear wheels firmly blocked and braced. The company even engages the electric interurban lines in its car delivery service. It's a long drive from Michigan's capital to Raleigh, capital of North Carolina, but W. H. McElwee of that city, who is the dealer and distributor of Oldsmobiles in that state, had to help himself to cars or he would have had a car famine and possibly been put out of business. He and his staff of dealers journeyed by the rail route to Lansing last March and drove away from the factory 34 Oldsmobiles overland to the Tar State.

The last week in April the Oldsmobile distributor in Nebraska conducted his large number of dealers, the party occupying three Pullman cars to the factory at Lansing. Some of these dealers were accompanied by purchasers and 85 cars were driven back to a number of cities and towns in Nebraska.

Driveaways a "Blessing in Disguise."

That the necessity for factory driveaways, due principally to the railroads needing the rolling stock for transporting foodstuffs and other necessary supplies, will, in addition, prove a blessing in disguise to owners, is the opinion of Clifford A. Williams, director of sales of the Kissel Motor Car Co., Hartford, Wis. He says:

"We all know that when a new car has been driven 100 to 300 miles by a factory tester, a service man, or an experienced owner, it is bound to be in better condition for immediate use than a car shipped by rail to the salesroom.

"Inexperienced owners are apt to race their engine or drive at too high a rate of speed at a time when it is new and stiff and when cylinder walls and bearings have not been properly smoothed out. Such practise generally results in scoring the cylinders, necessitating reboring them, and fitting the pistons with new rings.

"Many of our dealers are conducting owners' driveaways from the factory un-

der the guidance and supervision of the dealers' service men, so that by the time the owner arrives home he will have learned how to properly shift his gears and how to gently engage his clutch instead of jamming or jerking it, which strains the whole power transmission, including everything from engine back to

Hudson Super Sixes in Driveaways.

The Hudson Motor Car Co. of Detroit has systematically organized its driveaways and its director of transportation confesses that he cannot any longer rely upon the railroads to get through the shipments of numerous cars within a reasonable time. Here is how he summarizes his company's difficulties in regard to railroad shipments:

"We require approximately 1000 freight cars a month at this season to handle our shipments of Hudson Super-Sixes. We are not getting an average of 10 cars a day. This brings our monthly supply down to about 250 cars. All automobile shippers are suffering alike in this respect. Whole sections, comprising groups of three and four states, have been embargoed against automobile shipments. Even if equipment is obtained, shipments cannot be made to such points.

"Even the aristocratic express car is no longer to be had unless an express car happens to be returning empty from Detroit to some point to which we can ship. The shipment must go direct to the point to which the car is ordered returned. Thus if an empty express car is leaving Detroit for Rochester, N. Y.,



The First Fleet of Class B Trucks Assembled at the Plant of the Indiana Truck Corporation, Marion, Ind., Ready for Driving to an Eastern Delivery Point.

and make the return drive. They were accompanied by the representative of the Reo-Atlanta company, distributors of Reo passenger cars and trucks, who piloted them through to the southern city. The drive of 1020 miles was made in record time and without an accident or trouble of any nature.

Class B War Truck Shipment.

One of the contracts made by the Quartermaster Corps, U. S. A., for class B (three-ton) trucks, was with the Indiana Truck Corporation, Marion, Ind., which constructed a special factory unit for the purpose of producing the machines in addition to its regular commercial output. The trucks produced are driven from the factory to the East and to the different points of service or shipment. When a sufficient number has been built to equip a full company, which requires 33 machines, a convoy is organized and manned by soldier drivers sent away. The accompanying photograph is of a street scene at Marion just before the company left for "some eastern point," and thence to "Somewhere in France." As will be noted the trucks are formed in "fours," with a driver standing in front and slightly at the left of each truck, which was an arrangement to obtain a better photographic effect, and could not be done elsewhere save in a public square.

DEARBORN TRUCK CO. LOCATED IN NEW PLANT.

On May 1st the Dearborn Truck Co. moved into new and larger quarters at 2515-25 W. 35th street. The company purchased a modern three-story brick mill constructed manufacturing building at a cost of \$105,000, with a large yard and private switch track.

The new property is 455 feet deep, with a frontage of 133 feet on West 35th street, giving a total ground space of over 60,000 square feet and more than quadrupling the present capacity of the old Campbell avenue plant. A 450 kilowatt power plant elevator and new machinery have been installed, as well as a modern sprinkler system for fire protection.

This move into larger quarters and purchase of their own building was made necessary by the greatly increased demand for Dearborn Truck Units and the national success of this company's product. As formerly the factory sales office will be located at the plant proper.

Speaking of the purchase of the new plant S. D. Porter, treasurer and general manager, said: "The success of the Ford Dearborn unit with the Ford passenger car has only been surpassed by the growing popularity of the Dearborn Universal Truck Units, which by reason of their being adaptable to all passenger chassis have greatly broadened the scope of our business."

"THE DRAGON" NEW HOUSE ORGAN OF FAFNIR BEARING CO.

"The Dragon" is the title of a very modest magazine that is to be published

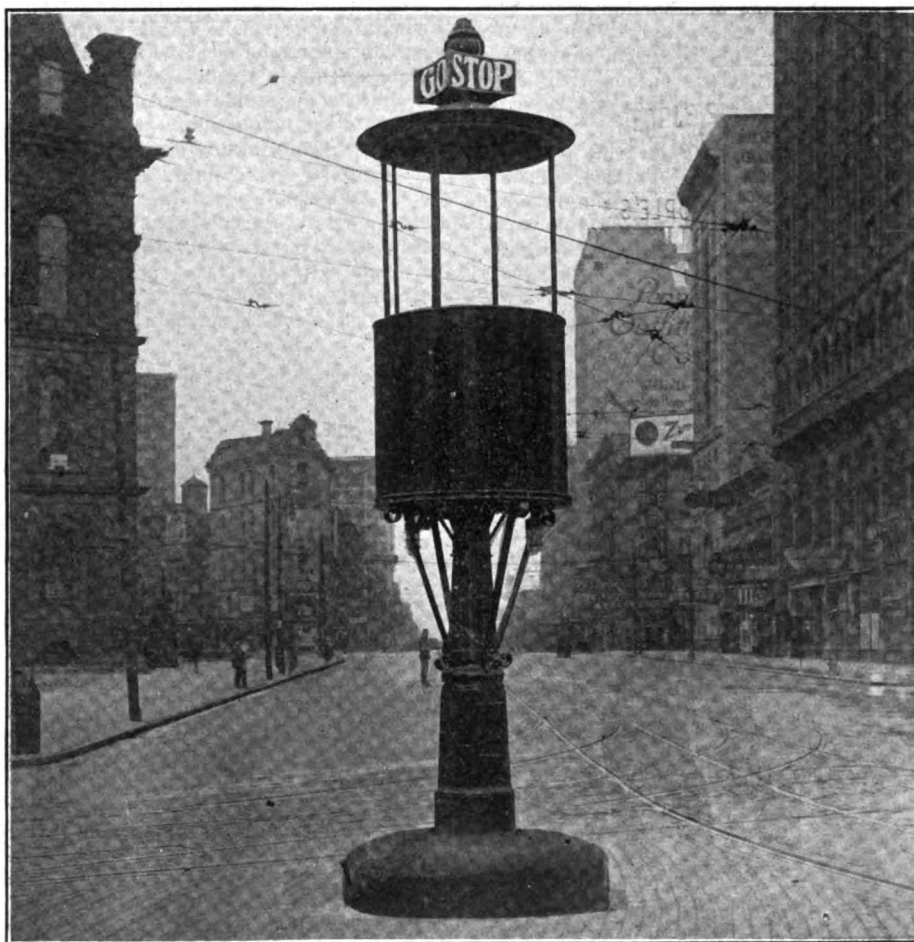
bi-monthly in the interest of ball bearings by the Fafnir Bearing Co., New Britain, Conn. It is the purpose of the magazine, as the editor explains, to supplement in some measure the company's constant efforts to cooperate with the customers and to establish more intimate business relations with those who are prospective consumers of Fafnir ball bearings. The magazine will be mailed to anyone interested in the subject of ball bearings upon application to the company.

PILOT MOTOR CAR HAS BEEN ADVANCED IN PRICE \$100.

The Pilot Motor Car Co., Richmond,

has been the subject of much study on the part of the Detroit authorities, who by the way, it might be stated, have inaugurated numerous methods of handling traffic problems. Another "made in Detroit" idea has recently been put into effect at this point which has a number of original features that will aid greatly in the control of the traffic. The traffic policeman stationed at this square now takes his stand in a tower elevated above the street, from which point of vantage he directs the stream of traffic which flows in and out of the square and signals to eight other officers who are stationed at the various corners to assist in the work.

The base of the signal tower, which is called a "crow's nest traffic signal," is of



The "Crow's Nest Traffic Signal Tower" at the Junction of Detroit's Busiest Thoroughfares, Woodward and Michigan Avenues.

Ind., has advanced the price of its four and five-passenger touring cars \$100 to \$1395.

DETROIT HAS NEW IDEA IN TRAFFIC CONTROL.

At Detroit's business traffic center, the junction of Woodward and Michigan avenues, which is also the terminus of Monroe street and Cadillac square, about 20,000 vehicles crossed in 10 hours according to a tally kept by the city police, and it is claimed that no other city in the world surpasses this record for any one intersection of streets.

This congestion of traffic at this point

concrete with a steel superstructure, which supports a signal box six feet above the ground. On the top of the roof or canopy is a conventional "stop-and-go" signal, which is operated by the attendant.

NEW ERA PURCHASES THE PARRADEE SPRING AUTO BUMPER.

The New Era Spring and Specialty Co., Grand Rapids, Mich., has purchased the plans, manufacturing rights, machinery and equipment of the Parradee spring auto bumper. Edward Parradee, the inventor, will remain and superintend the manufacture of the bumpers.

Predicts Advance in Car Prices

F. H. Ayers Gives Reasons Why Higher Car Values Are in Prospect if War Continues

FORDS at \$1000 at the factory—that is the prospect if the war lasts two years more," says F. H. Ayers, sales manager of the Reo Motor Car Co., Lansing, Mich.

"The public has been told repeatedly that there will be a shortage of motor cars," says Mr. Ayers, "but they have not taken it seriously as yet. They have also been told that the scarcity of materials and shortage of labor has made the prices of motor cars advance, but so far as I have been able to learn, they have not been told that the reasons why materials are so scarce or why we have to pay so much more for labor.

"It seems probable now that the government will control the entire steel output, and of the high grade alloy steels, such as are needed for munitions, guns and motor trucks, they will use perhaps 75 per cent. for war purposes. This will leave 25 per cent. for the motor car dealers to scramble for and there will probably be some sharp bidding.

"Unless the government pro rates the steel among the manufacturers it will cost so much that car prices will be raised on that account. We are paying more for labor on account of a number of manufacturers bidding for skilled workmen to help them fill war contracts. As these contracts are figured on cost, plus a fixed percentage of profit, these manufacturers can afford to pay high prices for labor, as they make more profit on the time of the men when they pay them \$1 an hour than if they were paying 75 cents. We have lost about 800 men who are skilled workmen, and most of these have been taken away from us by firms doing war work, who could afford to outbid us for their services.

"These conditions are not growing better, and the public may as well prepare for higher prices.

"The Reo factory, like most other motor car plants, is devoting a large part of its energies to government work. We are now engaged in turning out tractors for hauling the heavy artillery on the European fronts. This represents several million dollars' worth of work, and it will naturally prevent us getting out as many cars and trucks as usual. We know we will be able to get out 8000 delivery wagons and at least 10,000 passenger cars, and after that we cannot tell what the future has in store, but feel confident that when we reach that point matters will be adjusted satisfactorily for continued production.

"We know that the primary business of the nation for the present is winning the war, and we hope to contribute our share of energy to that end and make all other business matters secondary to that one primary need. Business must speed up to shorten the war and the motor car industry has assumed such a

large place in our life that anything which affects it vitally is bound to affect hundreds of thousands of our wage earners. Then again the financing of the industry is quite a problem, and should production be seriously interrupted, the lack of production would make it impossible for many concerns to meet their financial obligations without depleting their capital.

"One of the problems that confronts the manufacturer who has been in business long enough to have thousands of cars operating in the hands of owners is the matter of replacement parts. We have on hand enough materials to take care of the normal demand for parts, and the parts department gets first call on all material, as we feel under obligation to make possible for our present owners of Reo cars to continuously operate them with the least possible interruption of service.

"This problem is worrying more than one small manufacturer, who can see some factory on which he has depended for parts and which could under ordinary conditions continue to manufacture, going to the wall for lack of ability to keep going under the numerous difficulties that all of us face today.

"It is unlikely that the public will ever be able to buy cars as cheaply as a few months ago, and if the war continues for two years, and it probably will, I expect to see Fords listed at \$1000 at the factory and all others in proportion.

"When prices were at the low point a year or so ago the margin was unsafe, and prices would have had to advance even if war conditions had not made it necessary. We have never had a greater need of motor vehicle transportation than now, and as our business speeds up it will become more acute, for we cannot at this time expand our railways fast enough to take care of the extra burden imposed on them, and motor cars will have to act as relief.

"The sensible thing to do is to buy cars now, when they are available, for with increased prices coming and a greater demand for a lessened output, they are a gilt-edged investment."

APRIL MOTOR PRODUCTS EXPORTS SHOW INCREASE OVER MARCH.

The exports of automobiles, trucks and parts during March amounted to \$9,355,168, an increase of 12 per cent. over the March figures, but less than the amount exported during April, 1917, when exports totaled \$11,019,354.

The April exports, however, are the largest for 1918.

During April 655 trucks were exported, as compared with 620 in March and 1031 last April. Of these 95 went to France,

142 to Canada and 116 to Great Britain. Passenger car shipments numbered 6104, by far the largest single item being a shipment of 1915 to Canada. In March, however, the number of passenger cars sent to Canada was 2276. The value of passenger cars sent to Argentina was \$174,674 in April, as compared with \$49,520 in March. Chile's purchases decreased from \$186,928 in March to \$78,966 in April. Australia received 418 cars in April, as compared with 248 in March. New Zealand received 235 in April, as compared with 19 in March. The Dutch East Indies bought 65 in April and only one in March.

During April 10,426 gas engines were shipped, as compared with 10,215 in March. The value of the former was \$4,694,359, as compared with only \$2,275,984 in April, 1917. The value of engines exported was the largest item in the total list. Passenger cars come second, with a value of \$3,958,560, and automobile and truck parts, exclusive of engines and tires, come third, with a value of \$2,895,600.

BOOKLET ON HARRISON PRODUCTS.

The Harrison Works, paint and chemical manufacturers, owned and controlled by E. I. Du Pont de Nemours & Co. of Wilmington, Del., have just issued six new and attractive booklets on the various products of their manufacture.

An attractive little folder sets forth a list of the heavier chemicals, as alums, acids and a miscellaneous variety under the name of "Harrison Blue Ribbon Chemicals." In connection with a classification of the different materials it also lists the nature of the trades or industries in which they are used, and in many cases states how they are used.

The subject of "Harrison Oil Stains" is treated in a two-page folder, the cover of which represents the panel of a door lithographed with the natural color and grain of the wood. What appears to be a departure from the ordinary type of stain folder is the way the samples of oil stains are displayed in the folder. A very thin veneer of real wood is treated with the stain, which brings out the beauty of the wood much more naturally than can be done by the lithographer's art. On the back cover of this pamphlet are also listed the other Harrison home improvement materials.

One of the most appropriate three-page folders, especially at this time when the last year cars are being run to their limit, is the one by the name of "Harrison Automobile and Carriage Paint," containing representative colors in car painting. The front cover pictures a newly painted automobile of grayish blue body and vermilion wheels. The first and third inside pages illustrate the colors which are recognized as standard by automobile painters. Instructions, plainly written, accompany the folder.

Copies of these charming little examples of the printer's art are ready for distribution to all persons requesting them. Address the home office at Wilmington, Del.

Conservation Hits Passenger Car Production

Fuel Administration Announces Allotment of Coal For Manufacturers—Revenue Bill May Include New Automobile Tax

Practically the first step taken in the program for curtailment of fuel consumption to meet the anticipated shortage of coal next winter directly affects the manufacture of passenger automobiles, the announcement being made that this industry, beginning Aug. 1, would be permitted to consume but 25 per cent. of the quantity of coal used in 1917-18. This order was definite and was not included in a list of so-called non-essentials, as it is understood that the Fuel Administration will hereafter issue individual orders applying to a particular industry.

Fuel Administrator Garfield has received a report that 100,000,000 tons more of coal than was produced this year will be needed to meet the demands of the coming year, which is based upon an estimate of 80,000,000 tons for actual demand in sight, with an additional 20,000,000 tons to allow for progressive war preparations. The administrator says that increased production of coal cannot meet this demand and a saving of 60,000,000 tons of coal only can save the country from disaster.

"Necessities of war must be supplied," the administrator states, "and the coal deficit must inevitably come out of the fuel for non-war industries."

There are other activities at Washington indicating that the automobile is running the gauntlet of legislators and administrators, who are fishing around for something upon which to place the burden of the taxation that must be increased to defray war expenses.

Congressman Cox of Indiana introduced a measure proposing a tax on automobiles on a sliding scale, with the original selling price as a basis, beginning with a minimum of \$10. This bill, which it is figured would raise a total of \$250,000,000, was referred to the Ways and Means Committee, which is framing the new war revenue program for raising \$8,000,000 by taxation.

The Cox bill provides for a \$5 tax on motorcycles and a tax of \$10 on automobiles, the original listed selling price of which in the United States is not over \$500. On cars originally listed at over \$500 and not more than \$750, the tax would be \$20; over \$750 and less than \$1000 the tax would be \$30. An additional tax of \$20 would be imposed for each further increase of \$500 or fractional part thereof up to and including the original list of \$3000; and \$30 additional for each further increase of \$500 or fractional part thereof of the original listed price.

The initial tax would be assessed upon passage of the law and thereafter annually upon the first of July and new cars would be taxed at the time of purchase. On old cars a concession is made of 10 per cent. a year up to 50 per cent.

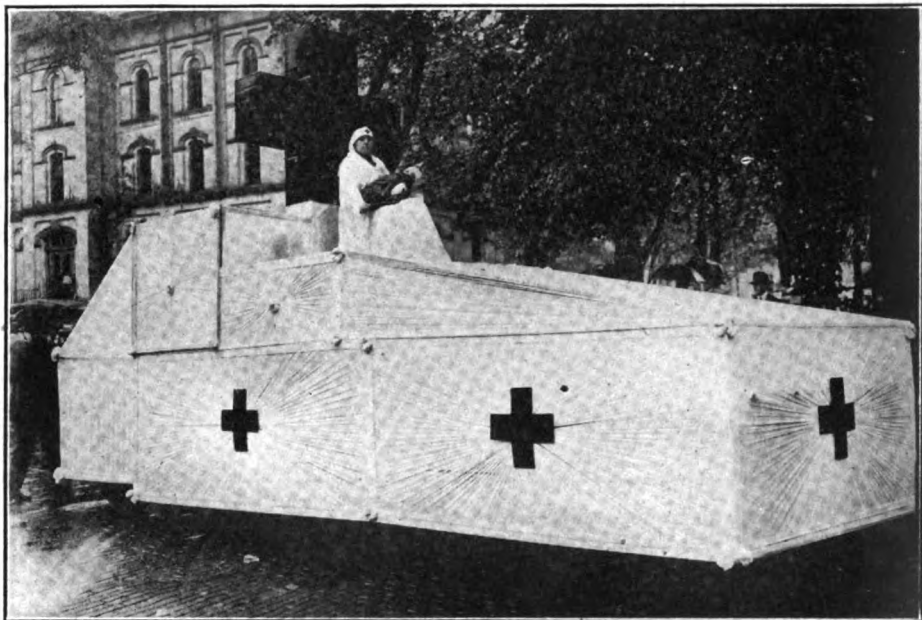
At one of the recent hearings of the new revenue bill before the Ways and Means Committee, Prof. Oliver M. W. Sprague, professor of banking at Harvard University, recommended a tax of \$10 to \$50 on each chauffeur and 25 cents a gallon on gasoline. The chauffeur tax, he said, would cause the rich to give up this luxury and drive a number of excellent mechanics into the army.

"There is little evidence of economy in running cars for mere purposes of recreation," said Prof. Sprague. "It is difficult to convince the ordinary man that he should skimp and save to buy War Stamps and Liberty Bonds when he sees automobiles whirling around the country in swarms. I would not tax the automobile, but would impose a tax of at least 25 cents a gallon on gasoline used for pleasure purposes, and would put a

Overland company as secretary, sales and advertising manager. In 1910 he went to the Hudson Motor Car Co. and was connected with the sales organization for five years, finally taking charge of the sales on the Pacific coast. He purchased an interest in the Northwest Motor Co., in Seattle, in 1916, distributing Hudson and Packard cars in a large territory. At the time the Premier was taken over by its present management Mr. Stubbs returned to Indianapolis and became sales manager.

GENERAL MOTORS CORP. WILL HAVE ASSEMBLY PLANT.

The General Motors Corporation will erect body and assembly factories at St. Louis, Mo., and has purchased a site of 105 acres for the new plant, which will



The Float Shown Above Was Greeted with Applause As It Passed in Review of the Thousands Who Witnessed the Red Cross and Decoration Day Parades in Toledo, O. Modeled After the Famous Red Cross Poster "The Greatest Mother in the World." The Champion Spark Plug Company of Toledo Conceived the Idea and Miss Hazel R. Eiben Was Chosen from the Girls in the Office to Pose.

tax likewise on chauffeurs. England taxed gasoline sixpence (12 cents) a gallon.

P. D. STUBBS OF PREMIER DIES IN MASSACHUSETTS.

P. D. Stubbs, general sales manager of the Premier Motor Corporation, died June 4 in Brookline, Mass. He was on an automobile trip with his wife and was touring in New England with the hope of recuperating his health.

He had been with the Premier organization a little over two years and was at one time associated with the Willys-

be erected at once.

Russell E. Gardner, president of the Chevrolet Motor Co. of St. Louis, has sold his holding to the Chevrolet Motor Co. of New York for \$1,000,000. W. C. Durant, president of the General Motors Co., was in St. Louis on May 27 to complete the deal, and a manager representing the purchasing company will take charge of the plant on Aug. 1. The Chevrolet Motor Co. of St. Louis was formerly the Banner Buggy Co., which was founded by Gardener. It has been the body factory for the western assembly plants for Chevrolet cars and employs more than 100 persons.

Bay State Dealer Has New Idea in Garage

Taunton Velle Agent Transforms Old Armory Into Modern and Attractive Establishment.

L. B. Goward, agent for Velle cars and international motor trucks in the territory centering at Taunton, Mass., recently opened one of the most novel, modern and spacious garages in New England in that city, and while it was established in an old building, it is more attractive as to both exterior and interior appearance than if a new structure had been erected for the purpose, while

"Armory Garage," which is the only exterior indication that the structure has been diverted to business purposes.

It was exceptionally well adapted for the purposes of a garage and car agency, being 141 feet in length and 60 feet in width, the main floor, which is used for garage and repair purposes, being 100 feet long and 60 feet wide clear of posts or other obstructions to interfere with the moving of cars about. Spacious head room, there being an unbroken area of 29 feet from the floor to the peak of the roof, makes it airy and agreeable. The two-story front provides two offices on the first floor and rooms on the second floor, the latter being equipped as a ladies' waiting room.

The treatment of the interior incorporates Mr. Goward's ideas of the proper garage atmosphere, the walls being painted in glossy white enamel and are conspicuously free from signs or other

Parke, president of the Olympian Motors Co. of Pontiac, Mich. As one of the first and most important steps in this direction, Mr. Parke suggests a more extensive use of substitute leather for upholstery in passenger cars and trucks.

"Automobile manufacturers will go a long way toward meeting the government half way in its efforts to keep the industry going by the use of substitute leather. In addition to the tremendous amount of leather being used by our government for harness, saddles, shoes and a hundred other things, the allied governments are laying plans to buy leather in the American markets for use of the armies in France in a very short time. The British government purchased a large amount of leather last year and consumed almost the entire supply of some grades.

"Shoe factories also will be busy making shoes for General Pershing's army, as War Department plans to call for a million and a half each month beginning July 1. This means that the country's source of leather supply will be strained to the limit."

Mr. Parke has made a complete investigation of the possibilities of substitute leather and has come to the conclusion that for most purposes it should give as much or more satisfaction than the best leather. Tests have repeatedly shown that the tensile strength is greater and that it will far outlast real leather. Substitute leathers are usually made of a water proof material and are not affected by weather as is leather. For this reason the War Department has specified substitute leathers for many army uses, such as truck covers, ambulance upholstery, sweat bands in steel helmets, leggings, water proof coats and ponchos.

The automobile manufacturer will not save any money in using the substitute leather. It will cost him as much as some grades of leather that have been universally used during the past few years.

"I believe automobile buyers will readily cooperate if all automobile manufacturers will adopt the substitute leather as a patriotic move," says Mr. Parke. "I have discussed the subject with a great many dealers during the past week and all have expressed their enthusiastic willingness to cooperate. These same dealers have since written me that owners to whom they have talked declare that they will be glad to accept their cars, whether they be expensive 12-cylinder cars or light, medium priced cars, upholstered with substitute leather. It is up to everyone of us to work with the government at this time, and I believe the automobile industry can do much by taking action in this matter at once."

MAY REFUSE STEEL FOR USE IN LICENSE PLATES.

It is reported that the War Industries Board will not permit the manufacturers of license number plates to use steel for next year's production. About 500 tons was consumed in this business last year.



Old City Armory, Taunton, Which L. B. Goward Has Transformed Into Model Garage with Many Novel Features.

nothing has been sacrificed from an efficiency viewpoint.

The idea that a garage and repair shop must necessarily have an atmosphere of darkness and dirt and reek with the odor of gasoline and oils was disposed of by Mr. Goward when he purchased the old Taunton City Armory to use as a business headquarters for his agency, garage, repair and supply business. The front of this building, two stories in height, with a dormer tower on the roof and large main entrance in the center directly beneath, and opening onto a main thoroughfare, needed no treatment to improve its appearance. It was one of the most attractive building exteriors in the city, being of brick with stone trimmings and archway over the entrance and the whole beautified by a dense growth of green ivy extending from the underpinning to the eaves. Nothing has been detracted from this striking effect by the erection of well lettered and not too large sign, reading,

disfiguring objects, the only notices appearing in the structure are small, near, gold lettered signs, directing the customers to either the office, ladies' or men's room.

In keeping with his policy of affording customers an agreeable and attractive place in which to do business, he also insists on satisfactory service, keeping the garage open day and night with repair men and attendants always on duty. He also carries a full line of supplies on hand, including tires, tubes, lubricants and accessories, so that customers can receive every accommodation and without delay.

USE OF SUBSTITUTES FOR LEATHER TO CONSERVE HIDES.

Manufacturers of motor cars can effect a considerable saving in material if reasonable care is exercised in the selection of substitutes, according to Fred K.

Entire Steel and Iron Output May Be Used for War

Extra Demands from Front for Munitions and Materials Upsets Schedule of War Industries Board for Home Use

FOLLOWING reports in Washington that General Pershing had requested 2,000,000 tons of projectiles and shells in excess of estimates, Edwin B. Parker, chairman of the priorities division of the War Industries Board, stated that the demand had exceeded the present supply. This announcement, indicating the possible withdrawal of steel from every other use in this country except for war, was made just prior to a conference with jobbers of steel hardware and machinery men.

Judge Parker made public a communication which had previously been placed before the conference, bearing on the situation, which in part was as follows:

"Because of the abnormal demand for iron and for iron and steel products created by the war it has become evident that the demand far exceeds not only the present supply, but it is feared the supply that can be made available during the war.

"That the direct and indirect war requirements must have precedence admits of no argument. War bulletin No. 35, issued by the Chamber of Commerce of the United States, outlines in general terms the priority policies affecting industry adopted by the War Industries Board.

"The problem involving the extent to which if at all the government should assist jobbers in maintaining stocks from which direct and indirect war requirements and requirements of exceptional and national importance can be drawn is a perplexing one, coupled with which is the further problem as to the methods to be adopted, the procedure to be followed, to prevent hoarding on the part of the jobbers and to insure that distribution through them will be restricted to essential uses.

"While the War Industries Board has given careful consideration to these problems, it is anxious to have the benefit of the views and suggestions of representatives of the jobbers with particular reference to the service, if any, they can render the government in providing the machinery for a properly restricted distribution of iron and steel products."

DETROIT SECTION S. A. E. ELECTS NEW OFFICERS.

The Detroit section of the Society of Automotive Engineers held an election meeting on May 24, when the following officers were appointed: Chairman, J. Edward Schipper; vice chairman, A. C. Hamilton, chief engineer of the Oakland Motor Car Co.; treasurer, Don G. Hastings, chief engineer of the Holley Carburetor Co.; secretary, C. F. Van Sick-

len, secretary of the Van Sicklen Speedometer Co.; member of national nominating committee, R. E. Wells, engineer of the Hyatt Roller Bearing Co.

N. A. C. C. STARTS CAMPAIGN TO AID RURAL EXPRESS LINES.

District representatives are being appointed in all the principal centers by the National Motor Truck Committee of the National Automobile Chamber of Commerce to assist in the discovery of routes over which rural motor express lines can be operated successfully and to help in getting such services started.

The committee has issued a series of pamphlets giving in detail a list of services to be rendered by such express lines, the scale of charges, a sample cost sheet, suggestions for the preliminary survey of routes and canvass of prospective customers, operating plans and general suggestions. This printed matter is available to anyone interested and will be sent upon request addressed to the N. A. C. C., 7 East 42nd street, New York.

The committee has undertaken to interest the 115 motor vehicle manufacturing members of the chamber and between 30,000 and 40,000 dealers in this patriotic movement. In this work it is aiding the Highways Transport Committee of the Council of National Defense, as a result of whose investigations and efforts rural motor express lines will be in extensive operation before the summer ends.

The object is to provide a regular service, reliable in operation and reasonable in cost, for the farmer, who is affected by embargoes or inadequate railroad service, or is so far from a railroad that hauling is unprofitable.

Farmers now served by motor express lines regard them as the greatest labor saver they have ever known and say that without the trucks they would have to stop shipping milk or garden truck, that their production has largely increased and that their produce is delivered quicker and in better condition than ever before. Many who formerly wasted material because it did not pay them to drive to town now make regular shipments.

Truck lines usually can be operated most successfully between two towns or a city and town 20 to 30 miles apart, carrying farmers' produce to the towns and bringing back merchandise to the farmers, the whole operation being carried through in a day.

Rural expressing has reached an interesting development in Maryland, where 20 lines carrying supplies into Baltimore

and Washington have a daily capacity of 115,690 ton-miles and can haul more than 100 tons a day into those markets and carry an equal amount of merchandise back to the farmers and country merchants.

Government agencies are much interested in such developments. Approval of the widest possible use of motor trucks for transportation by highway has been announced publicly by the Council of National Defense. The U. S. Food Administration has asked local food administrations to assist the rural motor express plan, pointing out that one man with a truck can haul as much farm produce as three men with wagons and cover three times the distance. The State Relations Service of the Department of Agriculture has circularized county agents urging their support, and the Chamber of Commerce of the United States has requested its many members to render assistance in the movement.

Ford Announces His Candidacy For Senator

Henry Ford announced in Washington, June 13, that after having seen President Wilson he had decided to be a candidate for United States senator from Michigan if the nomination should be offered him. In this statement he did not specify which nomination would be accepted. However, it is understood among political leaders that the President anticipates that the Republicans of the automobile state will make Mr. Ford their nominee and join forces with the Democrats to make the nomination equivalent to an unanimous election. Michigan Democrats meeting at Lansing, June 12, indorsed Mr. Ford as their choice for the nomination for the Senate.

Following is Mr. Ford's statement:

"At President Wilson's request I have decided to accept the nomination for senator from Michigan if tendered to me. Realizing that there are exceptional opportunities for service to our people during the present and coming readjustment, I am ready and willing to do everything I possibly can to assist our President in this great work. Every man must expect to make great future sacrifices and be prepared to serve wherever the greatest need exists."

Some of the Senate Republicans seemed disturbed over the Ford candidacy. A leading Republican said: "Mr. Ford is not a Republican, and if elected to this body as a Republican would probably vote with the Democrats by arrangement oftener than he would vote with the Republicans by choice. He has never, to my knowledge, voted the Republican ticket."

Senator Smith of Michigan, whose term expires March next, has announced that he would not again be a candidate, but after a conference with Mr. Ford he indicated that he might reconsider his intention to retire.

Federal Uniform Traffic Law

American Automobile Association Acts on War Matters at Sixteenth Annual Meeting

David Jameson of New Castle, Pa., one of the vice presidents of the Pennsylvania Motor Federation, figures as the 12th president of the American Automobile Association, having been elected at the recent annual meeting held at Atlantic City, N. J. Originally the meeting was scheduled for Washington, D. C., but inability to secure necessary hotel accommodations brought about the transfer to the seaside resort.

Since the American Automobile Association was organized in March, 1902, at Chicago, it has had an illustrious list of chief officers, beginning with Winthrop E. Scarritt of New York City. His successor was Harlan W. Whipple, a New Englander, who also had become a New Yorker, and after him came Dr. Julian A. Chase of Pawtucket, R. I., who was followed by Elliot C. Lee of Boston, Mass.

Next came John Farson of Chicago. Then the presidency shifted to Buffalo, N. Y., with William H. Hotchkiss as the occupant. Lewis R. Speare of Boston succeeded him in his third year, when Mr. Hotchkiss was selected by Governor Charles E. Hughes of New York state to be the superintendent of insurance.

Robert P. Hooper of Philadelphia was eighth in line and he was followed by Laurens Enos of Buffalo. John A. Wilson of Franklin, Pa., cousin to the illustrious member of the Wilson family who lives in the White House, then served for 2½ years, giving way to Dr. H. M. Rowe of Baltimore, Md.

Mr. Jameson is a banker, besides which he is concerned in various lines of business and bears a high reputation in commercial circles in Western Pennsylvania. He is a pioneer good roads advocate and has participated in motoring affairs from the first appearance of the self-propelled vehicle.

The vice presidential list is made up of Ralph W. Smith of Colorado, P. J. Walker of California, H. J. Clark of Minnesota, Clifford Ireland of Illinois, Dr. John H. Quayle of Ohio, Dr. R. R. Elmore of Kentucky and Preston Belvin of Virginia. H. A. Bonnell of New Jersey was elected treasurer for the 10th consecutive time, while John N. Brooks of Connecticut continues as secretary and A. G. Batchelder of Washington, D. C., as executive chairman.

Among the club admitted to membership were Dallas, El Paso and Cook county clubs from Texas; the Northville and Ovid clubs from Michigan; the Tulsa club from Oklahoma; the Greenville club from South Carolina; the McComb county, Richland county and Erie county clubs from Ohio; the Corning and Cincinnati clubs from New York, and the Macon, Moultrie and Vienna clubs from Georgia. The secretary's report

also showed the admission of thousands of individual members from all parts of the country.

Owing to the enormous increase of motor truck transportation and passenger



David Jameson of Newcastle, Pa., President of A. A. A.

car travel on account of war conditions, the directors of the American Automobile Association decided to urge Congress to pass a Federal uniform traffic law which will harmonize the regulations of the several states, particularly in reference to weight of loads, registration of vehicles and operators and miles per hour limitations. A measure now being

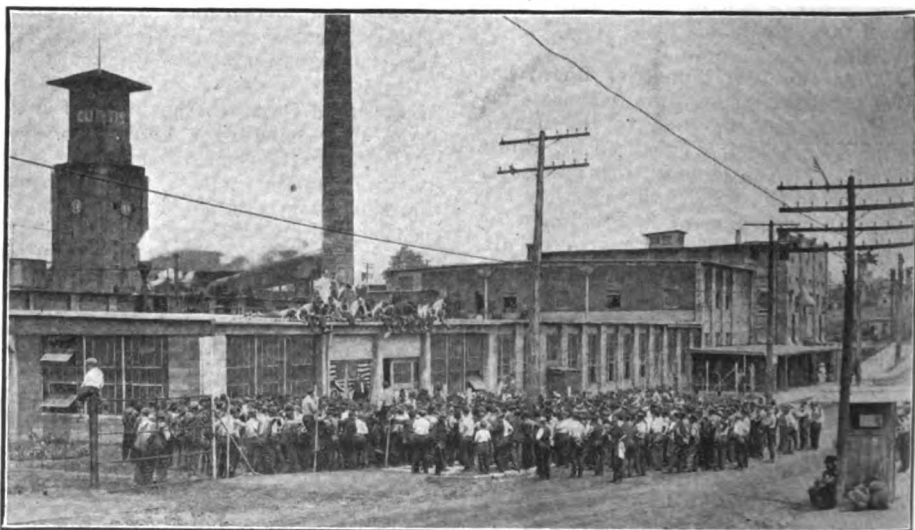
drafted will be introduced in Congress and undoubtedly will be referred to the committees of the two branches having to do with inter-state commerce.

In recognition of the acute governmental need for skilled automobile operators and mechanics, a resolution passed calls upon the motoring public generally to drive their own cars, as far as practical, and to equip their vehicles with such necessary supplies that they may reduce their emergency needs to a minimum, thereby cooperating with the automobile trade in reducing night and Sunday service. Furthermore, the automobile clubs are asked to formulate plans and assist in the training of motor mechanics through the maintenance of schools for this specific purpose.

Reference was made to the somewhat astounding lack of official recognition of the true importance of travelable roads at this time, and the War Industries Board was earnestly called upon to place roads, materials and machinery on priority lists, and the Capital Issues Committee was importuned to approve bond issues in connection with the construction of main arteries of communication.

Other subjects considered also related mostly to war matters, with highways improvement work repeatedly emphasized as an essential adjunct in meeting the country's transportation needs and offering substantial relief to rail lines. The employment of war prisoners and interned enemy aliens on roads was particularly dwelt upon. It was the sense of the meeting that at the conclusion of the war there would be a pronounced demand for a system of national highways to supplement the state systems gradually being created in all states.

Motor vehicle thievery, which has become an unmitigated evil, was thoroughly discussed and plans made to cooperate with both Federal and state police officials in meeting a situation which has assumed widespread proportions, and which it is believed can be remedied if the proper laws are enacted and enforced.



One Division of the Employees of Curtis Pneumatic Machinery Co., St. Louis, Mo., Listening to One of the Patriotic Talks That Were Held Daily During the Recent Liberty Bond and Red Cross Campaigns.

Cole Eight Model 850

The 22nd article in this series dealing with the overhaul of used cars. It is the purpose of these discussions to show that a used car has extensive service value, which can be greatly increased with but a slight outlay and the replacement of worn parts.

Overhauling The Automobile

IN ORDER that one may clearly understand the construction and functions of the Cole 850 power plant, a general description of the design, operation and relation of the most important parts and units, with their adjustment, are first given. Where a general overhaul is deemed not necessary, most all of the adjustments may be made without entirely disassembling the power plant.

The Cole 850 eight-cylinder motor is easily accessible. This is principally due to its simple construction, the eight cylinders being cast in two blocks integral with the crank case (see Fig. 2) and have detachable heads that can be easily removed to grind the valves or examine the inside of the combustion chambers and cylinder bores. The cylinders are of the L type, with fully enclosed valve stems, springs and push rods. As the cylinders are inclined at an angle of 45 degrees to the vertical, the heads come in a very accessible position. The long cap screws holding the removable head in position are easily removed and the heads taken off. The intake and exhaust manifolds are attached direct to the cylinder body, so that they do not interfere with the removal of the cylinder heads.

The crank case is divided vertically (see Fig. 2), with each half cast integral with one block of four cylinders. The bottom of the crank case is left open so that the bearings may be inspected and taken up when necessary without entirely disassembling the motor. This opening is closed by a pressed steel oil pan, which also serves as the oil reservoir (see Fig. 5). The rear portion of the crank case differs from previous Cole models in the elimination of the totally enclosed flywheel. The construction now permits easy examination of the clutch for adjustment when necessary, yet retains all the advantages of the unit power plant (see Fig. 1).

The water pump is located on the front of the motor, directly behind the radiator, and is driven from an extension of the camshaft, which passes through the front of the timing gear cover plate. It delivers an equal quantity of water to each of the two blocks of cylinders through openings at the bottom of the water jacket on each side.

The lubrication of the Cole eight-cylinder motor is by oil under pressure. A supply is carried in the oil pan (see Fig. 5). Oil is drawn from the oil pan and forced to the main bearings by a gear pump located at the front end of the motor under the timing gear cover plate. The pressure of the oil is regulated by a valve under spring tension. The tension is so adjusted that the oil pressure is between 30 and 40 pounds when the engine is warm and running at its maximum speed. When the pressure for which the valve is adjusted is reached the valve opens. The overflow is carried through a channel to the camshaft bearings and the chains.

The connecting rod bearings on the crankshaft are lubricated by the oil from the main bearings forced through holes drilled in the crankshaft. The cylinders are lubricated by oil thrown from the outer ends of the connecting rod bearings where the surplus oil escapes (see Fig. 4). A gauge indicating the level of the oil is attached to the crank case on the right rear corner. Whenever the indicator reaches the center position fresh oil should be added until the indicator returns to the mark "Top." If the indicator is at the bottom the engine should be stopped immediately and supplied with oil. Never risk running the engine after the indicator has dropped to the bottom. A filling hole is provided in the right side of the front gear cover and a petcock is located on the right side of the oil pan to test the oil level inside while replenishing the supply (see Fig. 5).

If the indicator on the oil pressure gauge, which is mounted on cowl board, vibrates or falls to zero when the engine is running it indicates that the oil level is low or that for some other reason oil is not being forced to the bearings and other parts of the engine; and, if such be the case, do not run the engine until you have investigated to see whether the oil supply should be replenished or whether there is any dirt in the system to clog the free flow of oil.

To clean out the oil pan: At the end of every 5000 miles, or every six months, drain the oil pan by taking out bottom plug (see Fig. 5) on right side and refill it with a mixture consisting of three quarts of kerosene and one quart of engine oil. The mixture must be entirely free from dirt and lint. Then run the engine at a speed of between 600 and 1000 revolutions per minute for about one minute. Then drain the oil pan, remove it from the engine and thoroughly clean the upper face of the strainer. Fill the oil pan to the proper

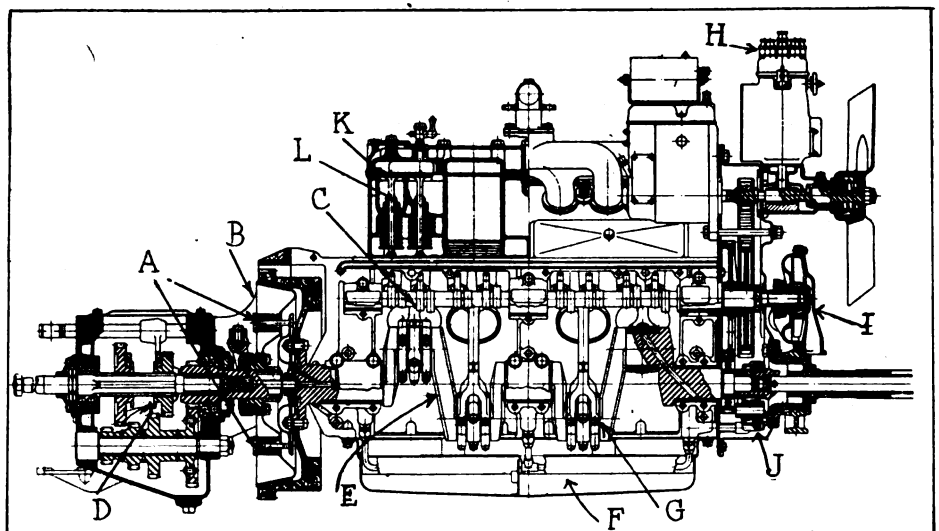


FIG. 1—EIGHT-CYLINDER COLE UNIT POWER PLANT.

B, Cone Clutch; A, Clutch Springs Where Adjustment is Made; D, Sliding Gear Set; C, Camshaft; E, Crankshaft; L, Valve Stem; K, Valve; G, Connecting Rod and Crankshaft Bearings; H, Delco Timer; I, Water Pump; J, Oil Pump.

height with clean, fresh oil after replacing it.

The pressure of the oil is regulated by a valve under spring tension. The tension of the spring is adjustable. The housing containing the valve is located at the side of the crank case just back of the left hand block of cylinders, near the bottom. A cap screw extends from the cap on the housing containing the valve. This cap screw is held from turning by a lock nut. To increase the oil pressure for any given engine speed, loosen the lock nut and screw in on the cap screw—that is, turn it clockwise. To decrease the oil pressure for any given engine speed, loosen the lock nut and unscrew the cap screw. It is best to make this adjustment when the engine is running at high speed. Under these conditions the pressure should be between 30 to 40. Do not make the adjustment until the engine and oil are thoroughly warmed up and be sure to properly tighten the lock nut after making the adjustment.

Specialty Designed Pistons Prevent By-Passing of Oil.

Due to the high pressure oiling system on this motor, which was adopted to give maximum insurance of long life to bearings, there is an excessive amount of oil thrown off the crankshaft and crankpin bearings, which, with the ordinary piston construction, would soon cover the combustion chambers with carbon deposit and also cause continual mis-firing due to oily and sooty plugs. This high pressure oiling system generates a mass of oil spray which flies into the left and right cylinder blocks in equal amounts. To overcome the by-passing of oil along the cylinder walls, pistons, with a series of holes just below the lowermost ring toward the top of piston (see Fig. 3), as well as another series of holes at bottom of piston, are used. Three rings are located above the piston pin, the bottom one of the three serving as a wiper ring. The ring scrapes the oil from the cylinder wall into a groove immediately below it. Holes are provided in the groove to return the oil to the inside of the crank case. A fourth piston ring is located about one inch from the bottom of the piston, and below this ring is another oil collecting groove similar to the one mentioned above. This groove also has a series of holes to return oil to the crank case. On the extreme bottom of this piston is located a third oil groove, which, in like manner, has holes drilled in it for the return of oil to the case. The two scraper rings and the three oil grooves, with their series of return or drain holes, keep the combustion chamber entirely free from oil. By this system of drain holes in the pistons the smoking of the motor is reduced to a minimum.

The Camshaft and Timing Engine.

The camshaft (see Fig. 4) is a high grade carbon alloy drop forging, heat treated and accurately machined and ground to size. It is mounted upon three extremely large phosphor bronze bearings. The cams are forged integral with the shaft and are all hardened and ground. There are 16 cams, a pair being provided for each cylinder in order to obtain the maximum efficiency by having direct acting cams and push rods. When only one cam is employed it necessitates the use of rocker arms, which add to the wearing parts and decrease the efficiency of the valve operation. The valve push rods have roller followers bearing against the cams, and

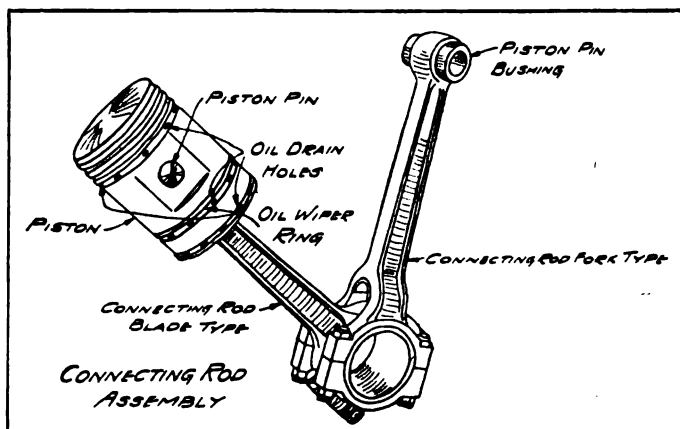


Fig. 3—Cole Connecting Rod Assembly, Showing Series of Holes and Wiper Rings for Preventing By-Passing of Oil Into Combustion Chambers.

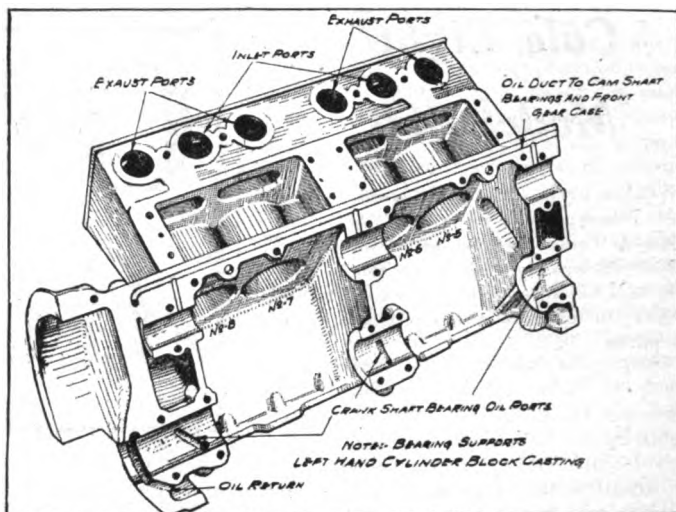


Fig. 2—Cole Block of Four Cylinders Cast Integral with Upper Half of Crank Case.

at their upper end a set screw and lock nut. The latter permits the valve clearance to be adjusted very closely. In practice these screws should be set so that they show a clearance between the adjusting screw and the valve stem of .004 to .006 of an inch, or about the thickness of two sheets of standard writing paper.

The valve timing of an eight-cylinder motor is somewhat different from that on a four or six. The cylinders are numbered 1-2-3-4 on the right side, beginning at the front, and 5-6-7-8 on the left, No. 5 being front cylinder on left side of motor. The order of the firing is 1-8, 3-6, 4-5, 2-7, which gives power strokes alternating on opposite sides. Each row of cylinders fires in the same order as the Cole four-cylinder motor, 1-3-4-2 on the right and 8-6-5-7 or 5-7-6-8 on the left. There being eight cylinders, each firing once in two revolutions of the crankshaft, the power strokes will come 90 degrees apart.

Adjustment of Main Crankshaft Bearings.

Remove the oil pan from the bottom of the motor, taking care not to break the cork gasket between this pan and the bottom of the crankshaft. It will be observed that these bearings are carried in the left hand side of the crank case and are provided with liners, which are placed between the crank case and caps of the bearings. Adjust only one bearing at a time and continue to bring each cap toward the shaft until it just begins to bind the shaft. Then remove the cap and insert a set of thin liners so that the maximum clearance between the shaft and the bearing bushing is not less than .002 of an inch. If at any time it is necessary to remove all the liners and resort to filing the face of the cap, it should not be attempted except by a mechanic who thoroughly understands how to do it, as any inaccuracy in the work will usually prove disastrous to the bearing. In using liners care should be taken in reassembling to see that the liners are of even thickness on each side of the cap.

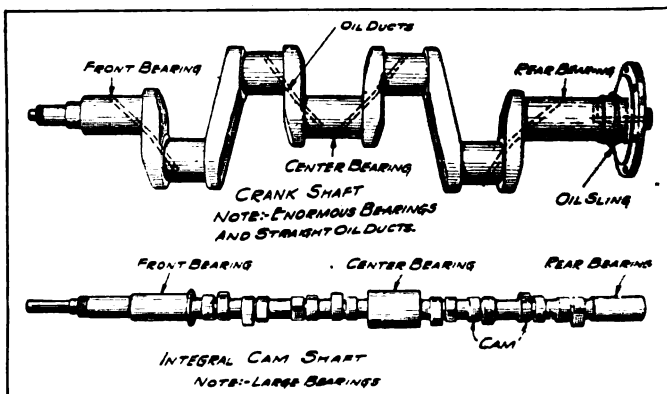


Fig. 4—Upper View, Cole Crankshaft, Showing Large Bearings and Oil Ducts. Lower View, Cole Camshaft.

Adjusting Connecting Rods.

The connecting rods are of two types, namely, a yoke rod and a blade rod (see Fig. 3). In the left block of four cylinders two yoke rods are attached to pistons 5 and 8, and two blade rods are attached to 6 and 7. The blade and yoke rods are attached to pistons in the opposite order in the right block. This manner of assembly is for the purpose of giving proper weight balance to the reciprocating parts. The yoked rods carry at their lower and nonadjustable ends bronze backed babbitt lined bushings. These bushings, besides being clamped in these rods, are also pinned into place to keep them from revolving in the yoke end. On account of the better wearing qualities when a high pressure oiling system is used, these bearings will run for many thousands of miles without attention. However, if as the result of improper lubrication these bearings have too much play on the crankshaft the bushings should be replaced by new ones. The bearings of the blade rod are formed by the inside diameter of the lower end oscillating over the center outside diameter of the forked connecting rod bushing. This bushing does not revolve, but acts much in the same manner as the wrist-pin bearing in the piston and, therefore, with proper lubrication, has far more durability than the ordinary type of connecting rod crankshaft bearing. These blade rod bearings, however, are made adjustable and liners varying in thickness from .002 to .006 of an inch are placed between their caps and the rods when the engine is assembled. To readjust, remove such liners as are necessary and remember that these bearings should have not less than .003 of an inch clearance.

In no event should any of the connecting rods or crankshaft bearings ever be taken up as tight, as is the usual practice in the ordinary motor, for the reason that the bearings used in this motor are of a very dense material and expand considerably under heat more than the average type of bearing. After taking up or readjusting the bearings in the motor, it is advisable after getting the motor good and warm to try the hand crank to see if the shaft or bearings have a tendency to tighten up, and if such is the case the car should be driven very carefully until such a time as the motor can be spun over freely by hand when it is hot.

The fan is driven from the timing gears through a friction clutch. The fan drive shaft also drives the timing mechanism of the Delco ignition system. If the fan has any tendency to slip the nut on the forward end of the shaft may be screwed down until the friction driving clutch is so tight that it will not slip. It should not be so tight, however, that you cannot turn the fan with your fingers when the motor is not running—just tight enough so that there is no slip when the motor is running.

Construction and Care of Clutch.

The clutch is the cone type (see Fig. 1) and does not differ in construction from that on the previous models, but it is much more accessible than formerly, as it is not enclosed in a bell housing. The clutch springs are mounted on a six-point spider supported from the rear extension of the crankshaft, located between the flywheel and clutch proper. These springs may be rapidly and easily adjusted to give the proper

tension on the clutch. A clutch brake is provided on the transmission housing and is brought into action by fully depressing the clutch pedal. Flat, hardened springs back up the leather facing of the clutch and the engagement is soft and gentle. The shaft which takes the drive from the clutch has four splines cut integral with the shaft, which permit the clutch to slide with freedom, yet absorb the torque perfectly. On the same end of this shaft is fastened the drive pinion of the transmission.

The clutch leather should be treated occasionally with a little neatsfoot or castor oil. Never use lubricating oil on the leather, as it will cause it to slip. If the clutch slips, clean the facing thoroughly with kerosene and apply neatsfoot oil. This same remedy can be applied if the clutch becomes dry and "grabs." To apply this oil, remove the toe-board, then cut a stick just the right length to hold the clutch out by bracing the clutch pedal forward from the front of the front seat. The oil can then be worked on the leather clutch facing with a stiff feather. Do not use too much oil. If the leather facing becomes badly worn or damaged by abuse, it should be replaced.

Transmission Gearset.

The transmission gearset is enclosed in a housing just back of the bell housing. It is the selective sliding gear type, with three speeds forward and one reverse.

For practises of overhauling transmission gearset, removal and grinding of valves and other methods of repair and overhaul of the power plant, see General Power Plant Overhaul in the issue of May 25th of Automobile Journal.

Timing the Delco-Cole Ignition.

The location of the distributor and timer (Fig. 7) is in front of the generator and is driven by gears from the same shaft that drives the generator. The distributor consists of a cap or head of insulating material, carrying one high-tension contact in the center, with similar contacts spaced equidistant about the center, and a rotor that maintains constant communication with the central contact. The rotor carries a contact button that serves to close the secondary circuit to the spark plug in the proper cylinder. Beneath the distributor head and rotor is the timer, which is provided with a screw in the center of the shaft, the loosening of which allows the cam to be turned in either direction to secure the proper timing, turning in a clockwise direction to advance and counter-clockwise to retard. The spark occurs at the instant the timer contacts are opened. The adjustment screw must always be set down tight after the cam is adjusted. This distributor is provided with both an automatic and manual control, the two working independently of each other. The manual is for the purpose of securing the proper ignition control for carburetor adjusting, slow idling, retard for starting and variable conditions. The automatic spark control is for the purpose of securing the proper control due to variations in speed only, and all that is required for normal driving is to secure the proper spark control for slow driving from 10 to 15 miles per hour (set spark lever two-thirds advanced) and the automatic feature will give the proper spark position for all higher speeds and for all lower speeds, excepting when the throttle is wide open, at which time the spark lever should be slightly retarded.

The ignition resistance unit is a coil of resistance wire wound on a porcelain spool (Fig. 7). Under ordinary conditions it remains cool and offers little resistance to the passage of current. If, for any reason, the ignition circuit remains closed for any considerable length of time, the current passing through the coil heats the resistance wire, increasing its resistance to a point where very little current passes, and insuring against a waste of current from the battery and damage to the ignition coil and timer contacts. This resistance unit serves as a quick and reliable method of testing the primary ignition circuit, the test being as follows: Pull out the "M" button on the combination switch and close the timer contacts in the distributor. The resistance unit should heat up sufficiently in 30 seconds to make a drop of oil on it smoke.

The condenser, which is attached to the forward side of the distributor housing (Fig. 7), is an assembly of metal foil and insulating material and it will ordinarily require no attention.

(Continued on Page 45.)

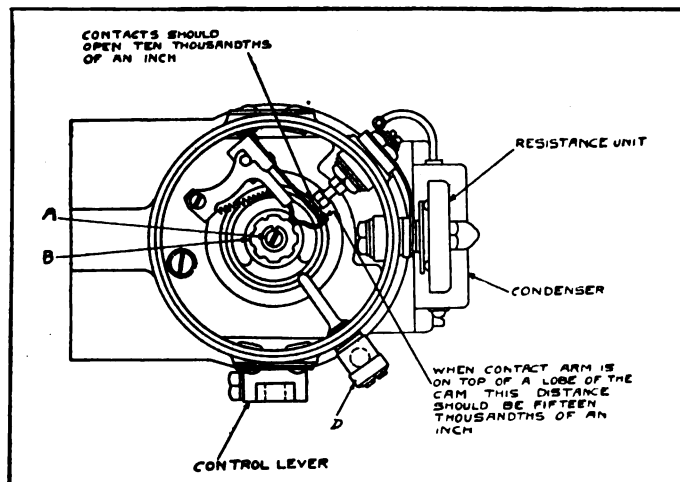


Fig. 7—Cole-Delco Distributor and Timer.

Personal News of the Industry in Brief

Robert M. Barker, for a number of years past well known in the advertising field and the motor truck industry, has recently been appointed director of advertising for the Sanford Motor Truck Co., Syracuse, N. Y. Mr. Barker has been engaged in the advertising business for the past 18 years. He was formerly advertising manager of the Chase Motor Truck Co. of Syracuse and later was associated for over three years with the Palmer-Moore company of the same city.

D. C. MacDonald, formerly manager of the Akron branch of the Mason Tire and Rubber Co., has joined the colors and is at Camp Meade, Md.

F. E. Mosher, general manager of the Covert Gear Co., Inc., Lockport, N. Y., announces that Alwin A. Gloetzer, manager, engineering sales and service departments, has left for overseas work for the government. He will be gone for several months and during his absence G. J. Conyne will be in charge of engineering sales and service at the Detroit office.

Leslie L. Newton has resigned as secretary of the Luther Grinder Manufacturing Co., Milwaukee, Wis., to become secretary, treasurer and general manager of the Stegeman Motor Car Co., Milwaukee. He will continue as a director of the Luther Co. Frank Hyland is his successor as secretary.

C. E. Bedell has been appointed superintendent of the boat hull works of the Curtiss Aeroplane and Motors Corporation, Buffalo, in the old experimental shop on Austin street.

Lloyd I. Seaman is now eastern district manager of the Knight Tire and Rubber Co., Canton, O. He will have headquarters in New York.

C. T. Chenevert has been commissioned a senior lieutenant in the Bureau of Aviation Operation, to supervise navy



C. T. Chenevert, Lieutenant in Bureau of Aviation Operation.

trucks in France. He was formerly vice president of the Denby Motor Truck Co., Detroit, Mich.

Richard Ferguson has been appointed managing director of the Grant-Lees Gear Co., Cleveland. He was formerly general manager of the company's East 69th street plant.

Ernest H. Crow has joined the New York City sales organization of the Rainier Motor Corporation. He was for 10 years with the Studebaker Corporation.

James H. Hay, who has been superintendent of the Wallis Tractor Co., Racine, Wis., since its establishment, has resigned to accept a similar position with the Lavine Gear Co., Racine.

H. W. Kardell, president of the Kardell Tractor and Truck Co., has removed from St. Louis to Oldsmar, Fla., where he will look after the work in the factory opening there.

Victor M. Stamm has been elected first vice president of the Rotary Club of Milwaukee. He is general manager of the Milwaukee branch of the United States Rubber Co., 41 Oneida street, Milwaukee, Wis.

A. D. Kelley has resigned as assistant general manager of the Signal Motor Truck Co. to become associated with the government. He was formerly connected with the Chalmers Motor Co. and the Dodge Brothers.

Thomas C. May has entered the U. S. service as a gasoline engine expert and will be stationed at the Great Lakes Training School. He was formerly city sales manager for the Ford branch at St. Louis.

Fred Z. Wright is now assistant general manager of the Newell Motor Car Co., St. Louis. He was a special representative of the Bell Telephone Co.

Louis W. Cossey has become identified

with the Lane Motor Truck Co. of Kalamazoo, Mich. He is sales representative for Western Massachusetts and New York state.

J. W. Ratcliff, who was formerly sales manager of the Signal Motor Truck Co. of Boston, Mass., has gone with the Aca-son Motor Truck Co.

Harold N. Bliss, formerly production manager of the engine department of the Timken-Morse Aircraft Corporation, is now superintendent of the engine department.

Nelson A. Manshop, for two years with the Hurlburt Motor Truck Co. in New York City, has been appointed branch manager of the company at Newark, N. J. He will have complete charge in the Newark territory.

N. E. Wahlberg has received a commission as major in the Quartermaster Corps. He was former chief engineer of the Nash Motors Co. of Kenosha, Wis.

Chester I. Campbell has been asked by the government, through the committee on Public Information, to take charge of the Allied War Expositions. The government is planning a series of exhibitions of war material captured by the various forces. Mr. Campbell is best known to automobile trade circles through his handling of the Boston Automobile Shows and other expositions in the Mechanics' building, Boston.

Walter Bauer has been elected president of the Pyrene Manufacturing Co. of New York City. He is vice president of the American Chicle Co.

Bert Pettit, advertising manager of the J. I. Case Plow Works, has been elected a secretary and a director of the Wallis Tractor Co. of Racine, Wis. Mr. Pettit was formerly connected with the J. I. Case T. M. Co.



Charles S. Pike, Sales Manager, Truck Division, Paige-Detroit Motor Car Co.



Max Hageistine, Factory Manager of Detroit Battery Co. and Disco Electric Manufacturing Co.

Max Hagelstine, one of the pioneers in the motor car business, having been placed in charge of the experimental work for the Peerless Motor Car Co. in 1900, and who also served the Garford Manufacturing Co. and the Rainier Motor Car Co. in a similar capacity, has been appointed factory manager for the Detroit Battery Co. and the Disco Electric Manufacturing Co. He takes up his new work after having completed 10 consecutive years with the Studebaker Corporation, where he has had a varied experience as plant manager, experimental engineer, assistant chief engineer and head of the Domestic and Foreign Service Department.

W. W. Burke is now in the sales department of the Pierce-Arrow Motor Car Co., Buffalo, N. Y., and will represent the company's interests. He is one of the veterans of the industry, starting with the passenger car side of the business, which he left to join the forces of Gray & Davis. Mr. Burke was formerly connected with the American Eveready Works, Long Island City, N. Y.

Richard Taylor is now in charge of sales of the Mayo radiator division of the Marlin-Rockwell Corporation as sales manager.

George W. Hoyt has resigned as chief engineer of the Harroun Motors Corporation to assume similar duties with the Oakes Co., Indianapolis, Ind., where he will take charge of developing the production of Oakes fans. He has been for many years connected with the engineering side of the automobile industry.

Joseph F. Higgins has become purchasing agent and manager of advertising for the International Insulating Corporation, Springfield, Mass. This company is now controlled by the Otto Heineman Phonograph Supply Co., New York City. He was formerly general superintendent of the New York Taxicab Co. and supervising inspector of the taxicab division of the city's bureau of licenses.

J. W. Fitzgerald, formerly president of the Detroit Starter Co. and later the Versal Products Co., has been made experimental and consulting engineer with the L. A. Young Industries, Inc., Detroit, Mich.

E. E. Peake has been made executive secretary of the National Automobile Dealers' Association and will be in charge of membership campaign. He will spend most of his time on the road, reporting directly to the office of President F. A. Vesper. Mr. Peake is secretary of the Kansas City Motor Car Dealers' Association and is widely known to motor car dealers and has been active in the work of the N. A. D. A.

C. A. Erickson has been appointed general manager of the Standard Radiator Co., Springville, N. Y. He was formerly chief engineer for the Scripps-Booth Corporation, Detroit.

A. H. McIntyre, who for the last few years was in charge of the wholesale department of the Saxon Motor Car Co. of New England, has accepted a similar position with the Paige-Detroit company at Boston.

L. E. Browning, formerly of the Kansas City branch of the Republic Rubber

Co., has been appointed district manager of the branch at 1456 Broadway, Denver, Col. He will take care of the mountain states of Montana, Idaho, Utah, Wyoming, Colorado, Arizona and New Mexico.

Frank B. Kern is now office manager of the General Motors Export Co., New York. He was formerly Australian representative of Willys-Overland Co.

E. M. Mark has been appointed president of the Pacific Motors, Inc., Elgin distributor in the Northwest. He will also head the Seattle Motor Car Corporation, retailing the Elgin and Harroun in King county. He was formerly secretary and treasurer of the North Pacific Oakland Co., Seattle, Wash.

Russ Baldwin has resigned as head of the speedometer department of the Champion Ignition Co., Flint, Mich.

H. F. Bennett, who has been manager of the advertising and efficiency departments for the Overland Automobile Co., St. Louis, has resigned.



Chester I. Campbell May Head Allied War Expositions.

Herman P. Schade, who was president and general manager of the Bearings Co. of Pennsylvania, Philadelphia, has been elected president of the Chalmers Sales Corporation, New York. The company is the eastern distributor of the Gill piston ring and other specialties.

H. J. Grosvenor, factory manager of S. F. Bowser & Co., Fort Wayne, Ind., has been elected secretary of the company to fill the vacancy caused by the resignation of Albert S. Bowser.

E. J. McMullen, formerly in the technical department of the Olds Motor works, received the commission of first lieutenant in the Quartermaster Corps of the National Army. He was chassis lecturer for the Olds company during show seasons and has given technical lectures from coast to coast.

Norman G. Wilson has been promoted to the position of branch manager of the Philadelphia branch of the Stanley Motor Carriage Co.

J. D. Nicklis has been elected president of the National Supply and Machin-

ery Dealers' Association at the society's 13th annual convention. He succeeds Herbert W. Strong, who has just completed his third term of president. Mr. Nicklis is with Manning, Maxwell & Moore, New York.

W. C. Poertner, National dealer, is now president of the Motor Club, the social organization of local tradesmen in New York City, succeeding Charles H. Larson. William Allen is the new vice president and James C. Nichols treasurer.

C. M. Waltman has been appointed assistant to Vice President Du Bois Young in charge of production of the Hupp Motor Car Corporation, Detroit. Mr. Waltman is well known in the automobile industry as production superintendent and also as famous driver for Glidden tours, hill climbs and economy tests for the old Premier Motor Co. He has had considerable experience in engineering and in production problems. For 19½ years he has been directly associated with George Wideley, one of the best known engineers and motor designers in the industry.

Walter J. Baumgartner has been advanced to the duties and responsibilities attached to the post of general superintendent of the Duplex factory. He was formerly chief engineer of the company. Mr. Baumgartner takes up the work laid aside by Former Superintendent W. H. Orpen, who has been commissioned a major in the Ordnance Department of the United States Army.

Col. Joseph D. Potter has been elected president of the American Motor Truck Co. He was formerly connected with the Kilbourne & Jacobs Manufacturing Co., Columbus, O.

Charles S. Shuman has resigned as manager of the Standard Metal Manufacturing Co. of Newark, N. J., to become sales manager of the Vacuum Muffler Corporation of 154 Nassau street, New York City. He was for years connected with the Klaxon Horn organization.

F. M. Dampman is now president of the Keystone Garage Equipment Co., New York. He was formerly salesman of the Motor Vehicle Publishing company.

D. Y. Husselman, for five years with the organization of the Kelly-Springfield Tire Co., has been made manager of its department of sales promotion, with headquarters at New York. He is succeeded in the management of the company's office by J. D. Ertel, office manager of the Kelly-Springfield branch at Minneapolis, Minn.

Henry Knippenberg, advertising manager for the Interstate Motor Co., Muncie, Ind., has resigned his connection with that company to open an advertising service agency.

John Riordan has joined the sales force of the Cleveland Milling Machine Co. He was formerly sales engineer for the Grant-Lees Gear Co., Cleveland, O.

W. A. Clare, for two years general sales manager of the Atterbury Car Co., Buffalo, N. Y., has been appointed assistant secretary of the company. Mr. Clare retains his supervision of Atterbury sales in addition to his new duties.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration

The Elkhart Carriage and Motor Car Co., Elkhart, Ind., has received a government contract for several thousand ambulance bodies. The contract does not mean the discontinuance of the company's automobile business. The company recently stopped making bodies with a view of using surplus capacity for government work.

foundry property, which will be used as a yard for storage.

The Cleveland Pneumatic Tool Co., Cleveland, O., will erect a one-story addition and basement structure, 183 by 50 feet, to its plant for machine shop purposes. The company has purchased one-half acre of land to accommodate the building of the addition.

Mountain will continue as president and general manager of the company. John N. Willys, W. C. Durant, C. W. Nash, R. S. McLaughlin and W. W. Mountain, all present stockholders, will retain a large percentage of their stock, the rest being taken by the General Motors Co. and E. I. Du Pont de Nemours & Co.

The Republic Motor Truck Co., Alma, Mich., is manufacturing trucks at the rate of 2200 a month. In addition, 10 trucks are being made daily for the government, making the total monthly output 2500.

The Dearborn Truck Co., Chicago, Ill., is now located in a larger plant on West 35th street. This is a three-story brick building with a large yard and private switch track. The ground space is 60,000 square feet and more than quadruples the old plant on Campbell avenue.

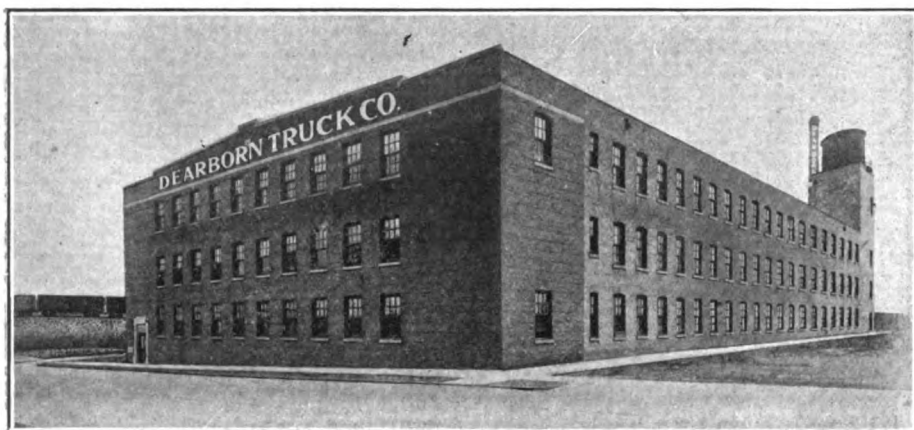
The Willys-Overland Co., Toledo, O., elected the following directors and officers at the annual stockholders' meeting: President, John N. Willys; first vice president, C. A. Earl; vice president in charge of sales, Edwin B. Jackson; vice president in charge of production, C. O. Miniger; vice president and counsel, James E. Kepperley; vice president, Isaac Kinsey; secretary, Royal R. Scott; treasurer, F. K. Dolbeer.

The Charles B. Bohn Foundry Co., Detroit, Mich., is erecting a new one-story plant. This new plant will have a capacity for turning out 40,000 to 50,000 pounds of castings daily. The plant will be completed about July 1. The company will produce a general line of jobbing brass, bronze and aluminum castings.

The Cantilever Airless Tire Co., Milwaukee, Wis., has changed its name to the National Airless Tire Co.

The Perfix Radiator Co., Racine, Wis., has increased its capital stock from \$15,000 to \$1,000,000.

The Ready Tool Co., Bridgeport, Conn., manufacturers of "the tool with the tool steel bearing," have just published their Quick Reference Catalogue No. 16. This catalogue illustrates and describes their chrome nickel lathe tools with the tool steel bearing, shaper and planer tools, tool holder for bench and watch lathes, which is the smallest tool holder on the market; boring tool holders, boring bars and internal threading tools, cutting off tools, threading tools, side tools, shaper or milling machine vise hold downs, lathe dogs, milling machine dogs, tail grinder dogs, balanced grinder dogs, handy holders, the Hill hold back dog, belt sticks, high speed steel cutters, and, lastly, a price list of extra cutters. This catalogue, which is small enough to be carried around in one's lower case pocket, will be sent to any reader of this publication upon request.



New Truck Plant of the Dearborn Truck Co., Chicago, With More Than Four Times the Capacity of the Old Factory.

The Arrow-Grip Manufacturing Co., Glen Falls, N. Y., has been reorganized with a capital of \$100,000 and will continue the manufacture of non-skid devices for motor trucks. Other accessories will also be manufactured. The officers are as follows: George Tait, president; William H. Dennin, vice president; T. M. Avery, treasurer; E. G. Mertens, secretary. The company has established sales branches in New York and Chicago and is planning to establish others in Montreal and San Francisco.

The Tulsa Automobile Corporation, Tulsa, Okla., is planning to build an addition to the plant. The capacity of the plant will be practically doubled.

The Madison Machine Co., Madison, Wis., has been organized to manufacture machinery, machine tools and mechanics' tools. The capital stock is \$25,000. The incorporators are the following: E. J. McEachron, Thomas C. Olson, E. A. Fuller.

The National Wire Wheel Works, Inc., Geneva, N. Y., has opened up service stations in San Francisco, Fresno and Los Angeles, Cal. This service will be handled by the Electric Equipment Co. Service stations will be opened in Seattle and Spokane, Wash., and several other important coast cities.

The Phoenix Motor Co. of Phoenix, Ariz., has been made distributor for Studebaker cars and Sandusky farm tractors for Arizona.

The National Bronze Aluminum Foundry Co., Cleveland, O., has purchased a piece of land 60 by 35 feet adjoining the

The Moon Motor Car Co., St. Louis, Mo., has received an order for shells amounting to \$2,000,000 to be filled at the rate of 1000 shells a day. The manufacturing work will be done by the Moon company and the MacDonald Engineering Co., a subsidiary of Moon.

The Klaxon Co., Newark, N. J., has absorbed the Stentor Electric Manufacturing Co., Long Island City, N. Y. The Autophone and the other instruments formerly made by the Stentor company will be marketed by the Klaxon sales organization.

The New Era Spring and Specialty Co., Grand Rapids, Mich., has purchased the plans, manufacturing rights, machinery and equipment of the Parradee Spring Auto Bumper and has added this to its regular line. Smalley Daniels is president and Edward Parradee, the inventor, will superintend the manufacture of the bumpers. The New Era company reports an increase of 50 per cent. over the business done last year. Two adjoining buildings have been added to the plant to increase manufacturing facilities.

The Fruehauf Trailer Co., Detroit, Mich., has enlarged its dealer organization and now has representatives in all states. It reports that business is increasing rapidly. The company is manufacturing 12 different types of trailers.

E. I. Du Pont de Nemours & Co. have purchased a large interest in the Flint Varnish and Color Works of Flint and Toronto. The board of directors will remain the same and W. W.

The Amazon Rubber Co., Akron, O., has declared a quarterly dividend of $1\frac{1}{2}$ per cent. The factory has been running day and night turning out about 250 tires daily.

Weiss and Sinclair, New York, has taken over the United States distribution of the Smith Auto Signal Corporation. The company is now located at 42nd West 39th street, but in the near future will move their offices and force to the plant of Smith Signal Corporation, 53-55 West 66th street. The price of the Smith Auto Signal is \$20.

The Metal Hose and Tubing Co. of Brooklyn, N. Y., has issued a new price list of gasoline hose and couplings. It is printed in two colors and illustrated with half-tone cuts. Anyone interested can secure a copy by writing for it.

The Defoe-Eustice Co., Detroit, manufacturer of canvas and leather specialties, has begun production in its new fourstory factory, which has been completed. Accommodations for a force of 1000 employees are provided. The building covers an area of 140 by 200 feet and practically the entire capacity is to be devoted to government contracts.

The Wisconsin Motor Manufacturing Co., Milwaukee, Wis., is building a large addition to the administration building of its main plant at 45th and Burham streets, West Allis, Wis.

The Universal Machinery Co., Milwaukee, Wis., manufacturer of machine tools, will start work on the first unit of its new plant. The first building will be brick and steel foundry with a two-story machine shop attached.

The Milwaukee Die Casting Co., Milwaukee, Wis., is erecting a large addition to its shops to be used for the manufacture of die cast bearings.

The Curtiss Tool Co., Fond Du Lac, Wis., has moved to larger quarters in the Hass Industrial building, and has increased its working force 30 per cent.

The J. I. Case T. M. Co., Racine, Wis., will begin the erection of another large addition to its works. The addition will be 144 by 513 feet of brick and steel and will be used largely to accommodate the overflow of domestic and foreign orders for Chase tractors.

The Tillotson Manufacturing Co. manufactured during 1917, 175,000 carburetors, as compared with 50,000 for 1916, an increase of $28\frac{1}{2}$ per cent. In the three years ending in 1917, 350,000 carburetors were built and shipped. The present plant now employs about 300 men. The company is getting into production on war work and will soon be employing 400 or 500 men.

The Dort Motor Car Co., Flint, Mich., on June 1 advanced the prices of Dort cars \$60 on all models, as follows: Touring car, \$925 instead of \$865; roadster, \$925 instead of \$865; sedan, \$1325 instead of \$1265; coupe, \$1325 instead of \$1265; sedanet, \$1060 instead of \$1000.

The Maxwell Motor Co., Detroit, Mich., has declared a $1\frac{1}{2}$ per cent. dividend upon the first preferred stock, payable in first preferred dividend certificates, deliverable July 1 to stockholders of record at the close of business on June 14.

The Studebaker Corporation, South Bend, Ind., have declared the regular dividend of 1% per cent. on preferred stock and one per cent. on common stock, payable June 1. Colonel George M. Studebaker has resigned as a member of the executive and finance committees.

The Moon Motor Car Co., St. Louis, Mo., has received a government contract to manufacture shells at the rate of 1000 a day. Production will be started in three months. A new building will be erected immediately for the work. The contract totals more than \$2,000,000 in value.

The Toledo Tap and Die Co., Toledo, O., is erecting a new factory. The building will be 200 by 50 feet and one story high. Machine tools, taps and dies will be made. The factory will be ready to begin operations about July 1. The company was recently organized by Robert E. Ellery.

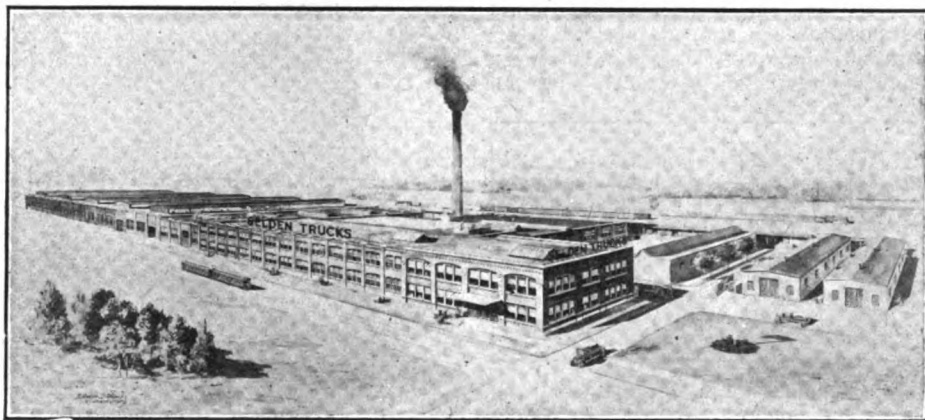
The Comet Automobile Co., Decatur, Ill., has offered its new building to the business men of the city for a "Made-in-Decatur" show. The various manufacturers of Decatur will make an exhibition of their products the last of this

are efficient for cars. By means of open transmissions and differentials visitors were able to see just how Dixon's lubricants cover all moving parts.

The Timken-Detroit Axle Co. has made a number of changes in its executive organization following the resignation of Eugene W. Lewis, vice president and director of the company. He severed his connection with the company to devote his entire time to government work during the war. A. R. Demory, a vice president of the company, has been elected general manager, and Frederick C. Gilbert, formerly secretary, has been elected vice president, in charge of sales and advertising, and C. W. Dickerson, the treasurer, has also been elected secretary.

The Nash Motors Co., Kenosha, Wis., has announced that the price of Nash passenger cars and trucks will be advanced, the new schedules becoming effective June 1 and superseding those set Aug. 1, 1917, which had been in force since that time.

The prices of Nash passenger cars and trucks, which will be effective June 1, will be as follows:



The Factory of the Selden Motor Vehicle Co., Rochester, N. Y., to Which a New Unit Was Recently Added to Assemble Army Trucks.

month. The main building is 600 feet long. As soon as the show is over the machinery will be installed. The plant will be in full operation by June.

The Stanley Motor Carriage Co., Newton, Mass., has appointed the following as distributors of the Stanley steam car: The Howard Automobile Co., 250 Boulevard, New Haven, Conn.; the Electrical Construction Co., Racine, Wis.; the Millen Motor Sales Co. of Millen, Ga., and the Northern Garage Co., Northern avenue, Avondale, Cincinnati, O.

The Hamilton Motors Co. of Grand Haven, Mich., manufacturers of the Panhard truck, will be known as the Panhard Motors Co.

The Minerva Engine Co., Cleveland, O., has moved to the Vickers building, East 66th street and Euclid avenue.

The Joseph Dixon Crucible Co.'s booth at the Automobile Show held by the Rothchild & Co. department store, Chicago, Ill., is shown in the May issue of "Graphite." During the week of the show over 100,000 people visited the Dixon booth and heard the story of Graphite Lubrication and learned why Dixon's graphite automobile lubricants

PASSENGER CARS.

Model 681—5-passenger touring car \$1395
Model 682—7-passenger touring car 1545
Model 683—4-passenger roadster... 1395
Model 684—6-passenger sedan..... 2085
Model 685—4-passenger coupe..... 2085

TRUCKS.

Model 2017—One-ton chassis.....\$1595
Model 3017—Two-ton chassis..... 2075
Model 4017—Nash Quad chassis... 3250

These prices are F. O. B. Kenosha and do not include war tax.

The coupe and seven-passenger touring car are new models in the Nash line and the prices given above do not represent an increase on these cars. The price of the Nash Quad chassis at \$3250 remains the same as heretofore.

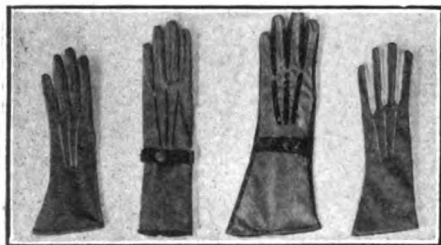
The Selden Motor Vehicle Co., Rochester, N. Y., despite the recent additions to the plant, finds its facilities for production inadequate. The expectation of considerably greater production prompted the original increases of the plant, which were available early in the winter. Now the company has taken over an additional property, which will be known as the Lyall avenue plant, which will be utilized for assembling trucks.

Fashion Abandons Fads and Fancies For Summer

By MRS. A. SHERMAN HITCHCOCK.

SPRING sees the birth and death of many fads and fancies in the realm of clothes, and it is usually well on in the season before the woman of limited means feels that the mode is sufficiently assured to warrant the buying of a motor wardrobe for her summer touring. But this season the whims of fashion have been forced to submit far earlier than usual and to the dictates of common sense—common sense inspired by patriotism in the matter of fabric conservation and then carried on into other fields.

Motor frocks, skirts and coats of woolen materials are narrow of skirt and tight of sleeve, but with no unpleasant suggestion of scantiness; while garments of other and softer fabrics are in many instances draped and even draped again with no suggestion of voluminousness. The manufacturers of woolen materials



Here are the smartest of the new motor gloves for summer. The gloves at each end are the "Simple Simon," while "Miss Muffett" is the one with the heavy black back. Palms of the finest quality washable cape and backs of soft thick silk in the original "streamline" effect.

(Courtesy R. E. Bradford, Gloversville, N. Y.)

are giving a great deal of their attention to government work and consequently have not brought out many new fabrics. There will be a few new Worumbos for the fall, but they are a secret as yet. They are the leading wool materials of this country and there has been nothing ever sent us from abroad that has excelled them and really few, if any, that have equaled them.

The favorites of last season—Hilendale, Poilu, Kashmir, Nanken and Camel's Hair—are all still rated as the smartest and best to be had, and of these the modish woman motorist will fashion her coat. For frocks, the Nanken, wool jersey, serge, tricotine and mohairs will be strong leaders.

Wool jersey lends itself admirably to practical motor use. The frock illustrated shows a model which could not be improved upon for general motor wear. It is simple and it is also extremely smart. This model may be worn at the majority of occasions in the city and is equally as appropriate for wear

in the country. It is one of the new straight line models, having a collar of self material and an over collar of white wool jersey. Rows of self color stitching in silk give a wide girdle effect at front. The tie sash of the material is finished with silk fringe and the top of the skirt section is shirred.

One of the most beautiful and smart-

est materials for the motor woman's frock is the very new Jersuniq, a silk jersey of unusual fine texture and quality. It is so beautifully woven and of so light a weight that it bids fair to be the most popular of all silk jerseys. This material comes in all the modish shades, but the ultra new shade is called "Cra-moisi" and the motorist who wishes to



A frock of this kind is very practical for the motorist—and very smart, too. Made of wool jersey in Copenhagen, Rookie or navy, the white over collar of white wool jersey, with its stitched girdle and fringed sash. It boasts a very smart simplicity. The hat, too, in matching color, is an admirable type for wear in the car.

(Courtesy Franklin Simon & Co., New York City.)

find something that is really new and rarely beautiful will do well to learn just what this shade is. The story of "Cramoisi" as told by the manufacturer is that it is the shade of a robe worn by Joan of Arc after the raising of the siege of the City of Orleans. It was one of the colors of the Duke of Orleans, whose friends presented Joan with the robe in this shade in consideration of the wonderful services she had rendered the people of Orleans. "The Life of Joan of Arc" by Anatole France is given as reference to this statement. It would make the smartest of sweater coats or sleeveless jackets in this particular shade.

One of the greatest delights in planning a motor wardrobe, or any other, for that matter, is the ability to express personality, and personality may be expressed in three mediums: Color, line and the combination of fabrics. There are many motor women who are doing considerably of their own sewing this season and with the many charming and practical materials at their command and the excellent patterns to be obtained nowadays, their task should be one of pleasure and satisfaction. Patterns make possible the above three mediums of expressing personality. The motor woman who is not familiar with their use will be amazed to find how very simple they become when each piece is stamped with its name in English, each seam is perforated and there are lines designating the lining, trimming and the main part of the garment. Considering all these details and the fact that exact directions are given, it is an easy mat-

ter to put together a coat, frock or skirt. A well cut pattern is the most practical aid to a war income on its way to a smart motor costume.

There is no material which will attain a greater degree of popularity or one more deserving this summer than the gingham. It began its social ascent over a year ago at Palm Beach, where so many of our best fashions have their birth, and that it has attained a high position in fashion's social scale is clearly evidenced by the fact that silks and wools are both patterned after it. It is an ideal fabric for motor wear from many viewpoints, and one particularly essential one is that its tubbing qualities cannot be excelled. There are ginghams and ginghams, however, and care must be taken to purchase those whose colors are guaranteed, whose texture is fine and whose patterns are modish. The Glen Roy Zephyrs answer all these requirements. They are woven as finely as a piece of silk, their designs and colorings are brought to the finest point of perfection and they may be worn upon the smartest occasions and hold their own. They are guaranteed to not fade and experience will convince the most skeptical that this is absolutely true. After any number of the hardest kind of tubbings without any particular care being given them to ensure retaining colors, they emerge as fresh and dainty as when first they made their appearance in the wardrobe. They wear wonderfully well and much may be accomplished with the Glen Roy Zephyrs, and there is nothing that will give a more fresh and summery appearance. Particularly lovely arrangements may be obtained by using some of the striped or plaid patterns. A perfectly plain frock of pale pink Glen Roy Zephyr with collar, cuffs and sash of striped pink and white is very smart. The old-fashioned china buttons, outlined in color to match, are especially good. A clever motor frock is shown in buff Glen Roy Zephyr with collar and cuffs in a plaid which combines yellow, green, black and white, with buttons of white china, outlined in yellow.

Sleeves on these frocks are made, in many instances, three-quarter length. A short sleeve of three-quarter length seems to go hand in hand with a summer fashion; it is so loose and so comfortable. And after the long, tight sleeves we have been wearing for the past two seasons, short ones are a most happy relief. A pretty arrangement for a three-quarter sleeve in a simple motor frock of Glen Roy Zephyr is a straight band of the checked gingham finished at either side with a fluted ruffle of white and on the under side it is finished with embroidered button holes through which a black silk ribbon is tied. The effect is very attractive and this style, if made separate from the sleeve, could be worn with an all-white frock or one matching the colors in the plaid and would give an entirely different effect on each frock.

And now come the new motoring gloves for summer and very smart and attractive they are. To see them is to immediately want them and the most perplexing part of it all is that they are



One of the smartest Shetland sweaters of the year and with features which make it particularly appropriate for motoring wear. Made in the modish drop needle pattern with extra deep sailor collar, patch pockets and attached sash. Comes in all the most popular shades. (Courtesy Navy Knitting Mills, Inc., New York City.)



The motor woman is always delighted to find a sweater garment with original and unusual features, which makes it just a little bit different from the great majority. Here is a style as novel as it is lovely, made in fiber silk in Copenhagen, turquoise, rose, Kelly green, purple, gold and salmon. It is of beautiful quality and fit and the gathered back and tasseled collar are new and attractive. (Courtesy Navy Knitting Mills, Inc., New York City.)

so lovely in style and color that it is most difficult to try and make a selection. The only way to be really satisfied is to take two or three pair and this is just what a great many motor women are doing. These new motor gloves are the "Simple Simon," "Miss Muffett" and the "Militant." "Simple Simon" is as simple as a smart glove can be and still give a perfect covering for the hand. They are made with fine, soft washable cape palms, with silk backs in green, blue, old gold, purple and yellow. The wrist is cut in "stream lines" to slip on easily, without button or strap. "Miss Muffett" is built with long slip-on wrist in "stream lines," especially for the motorist of fashion. They are decidedly English. With tan or ivory palm and Palm Beach silk back, also gray palm and gray silk back.

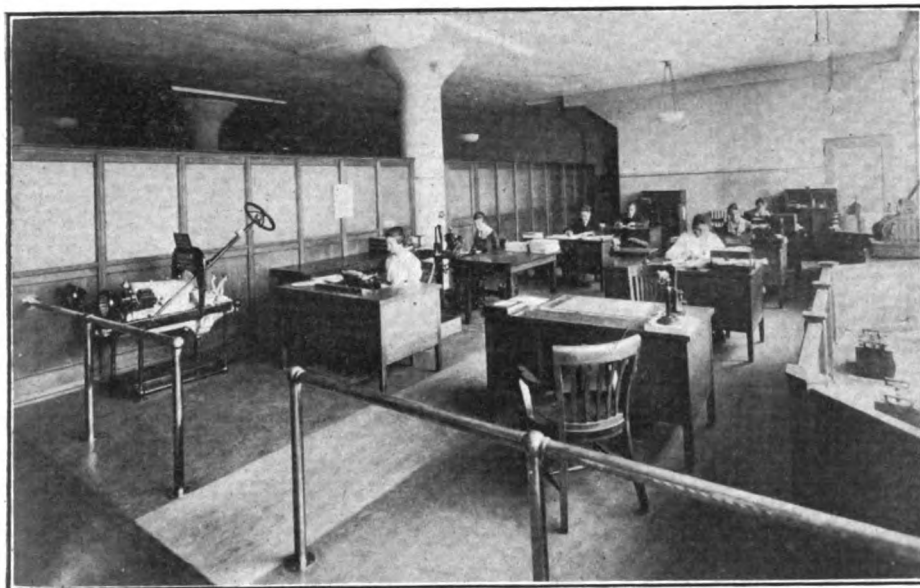
The Pettingell-Andrews Co.

AUTOMOBILE DIVISION

A Flourishing Accessory, Equipment and Supply Business
That Is Founded on the Policy of Unqualified
Satisfaction In Service.

THE advertised promise and the fulfillment thereof without restriction and in an unqualified manner has been the foundation of practically every great business success in America, and

there is a capacious business office and show room, large stock room, battery repair and storage department and large service room, where machines may be driven directly upon the floor to facilitate the work.



Main Office and Headquarters of Automobile Division, with Appointments and Equipment to Meet Business Efficiency Requirements.

most notably in the case of John Wanamaker of Philadelphia, who built up the greatest merchandising concern of the time on the slogan that goods are not properly sold unless the customer is satisfied. This principle, strictly adhered to by the Pettingell-Andrews Co. of Boston, jobbers in electrical supplies throughout New England for the last quarter of a century, brought its rewards in a steady, healthy growth to a leading position in the trade, and when the company built up an extensive automobile supply trade, this same rule applied and the result was a business development that has called for the establishment of a separate branch to handle this business.

This new branch is located on the ground floor in a new building at 100 Brookline avenue, the heart of the great automobile community in Boston, and has most modern and up-to-date equipment and facilities. It is under the management of W. E. Phinney and R. J. Brown, who are devotees of the true service idea. They dwell upon the fact that there are no "ifs," tricks, catches or obligations to the Pettingell-Andrews service, but that it is a service as complete and satisfactory to the public as an individual would give to himself.

In this new service station, which occupies 6000 square feet of floor space,

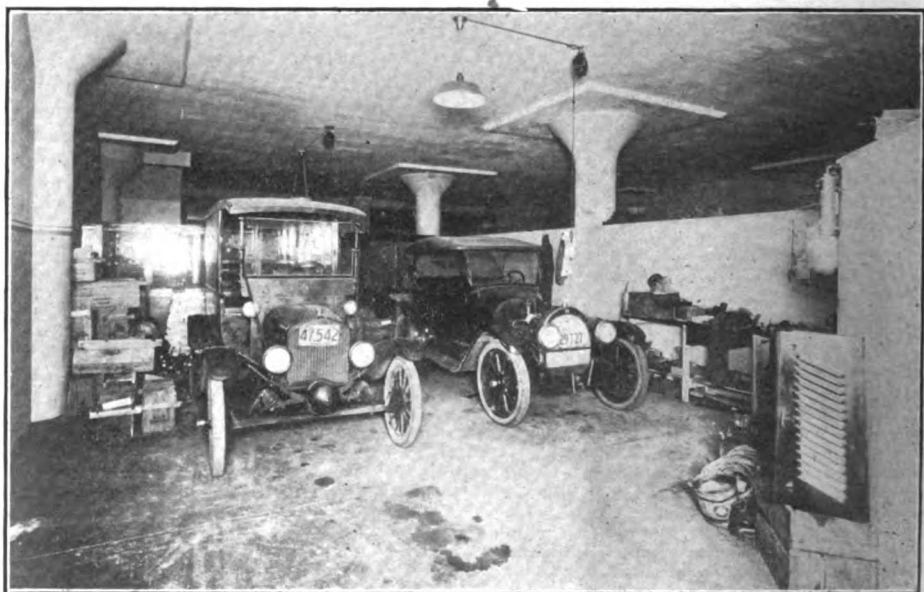
tate the work.

The equipment is complete and is capable of handling any rush of service, the various departments being so arranged that their capacity can be doubled whenever required. All the men in the



New Headquarters, Service Station and Sales Room at 100 Brookline Avenue.

Eveready storage battery department are factory trained and can give the most efficient service, as well as perform the most reliable and dependable repairs. They also are extremely scrupulous about giving nothing but strictly honest advice as to the condition of batteries and their repair needs, as the management, above everything else, insisted that the enviable reputation gained by the Pettingell-Andrews Co. throughout New England for the past 25 years must be maintained. To accomplish this end an organization as nearly ideal as possible has been placed in charge of the automobile division of the company on Brookline avenue, and it has been furnished with a modern headquarters, ideal location and model equip-



Spacious Service Room for Installation With Modern Appointments and Accommodations for Several Cars.

ment and starts with an established reputation.

The service man has explicit instructions to make an accurate test of batteries and to report the results without "hedging." If repairs to the battery are necessary the company will undertake the work only on the condition that they are sure the expense incurred will restore the battery to a satisfactory operating state.

Eveready storage batteries, made by the American Ever Ready Works, Long Island City, N. Y., is the leader of the Pettingell-Andrews line, and for which they are the New England distributors. Service on these batteries is extended throughout the territory through a comprehensive system of agencies established by the company, number over 100, and with stations in Providence, Worcester, Springfield, Portland, Bangor, Augusta, Nashua, New Haven and Hartford, which are equipped to render the same service in all respects as is given at the headquarters in Boston. Through this system of agencies the user of an Eveready battery in New England is never many miles from a station where he can have his batteries overhauled, recharged, exchanged or repaired. While acting as the exclusive distributor in New England for this battery, which is sold with a written definite guarantee of its service life, the company also gives repair service on all makes of storage batteries.

In addition to the Eveready line, which also includes the Eveready starting and lighting system for Ford cars, and the Daylo Eveready, a hand electric trouble lamp, the Pettingell-Andrews Co. is New England distributor for the Versal Products Manufacturing Co., Detroit, Mich., the Tungar Rectifier, the newest and latest designed equipment for converting alternating current into direct current for recharging storage batteries, which is made by the General Electric Co. A



Battery Service and Repair Room with Complete Equipment for Handling All Overhaul Work on Storage Batteries.

general line of electric supplies, lamps and storage battery parts are also carried, including the Automatic Extension Reel for electric lamps for use in garages, machine shops, factories, stores, carpenter and blacksmith shops, and Exemplar automobile polishes.

The leaders of the Versal products line are the Genolite and the Speederator. The former, in type H, is a six-volt system for lighting the Ford car through a battery and generator. It gives a constant and sure head and tail light while the car is running or standing idle. It can be easily installed and the generator unit of the system is sold separately to those car owners who have cars already equipped with six-volt storage batteries. The system can also be used for motor

ignition and the spotlight. Horns and dash lamps can also be connected with the battery if desired.

The Speederator is a device which automatically accelerates the speeds on the Ford engine for low and reverse speeds. It is so adjusted to meet the desired requirements that it acts independently of any extra movements of the foot pedals or hand throttle. It prevents the engine from racing and insures smooth running by automatically reducing the engine to idling speed when the gears are disengaged and also in changing to the different speeds. In addition to this the Speederator includes a foot-operated throttle, which is identical with those used on the highest priced cars. It entirely eliminates the danger of a "stalled" engine while pushing through traffic.

The device consists of a cross rocker shaft that is located behind the foot pedals and is supported by a bracket. On the shaft are two fingers that are immediately behind the slow speed and reverse pedals, the positions being such that when these are operated the movement of either pedal rotates the cross rocker shaft, opening the carburetor valve by means of the vertical arm on the shaft and a connecting rod to the carburetor. A spring takes up all lost motion and tends to keep the carburetor valve closed.

It is simple to install and men at the service station can apply it in a few minutes or any car owner with an ordinary mechanical sense can do the installation work.

The Eveready starting and lighting system is a "single unit system," which consists of a motor-generator, that is mounted in place of the crank on the front of the Ford car, for cranking the engine when starting and also for charging the storage battery when the engine is running.



Extensive Store Room with Capacity of Hundreds of Batteries Arranged to Give Service with Minimum of Delay.

The motor-generator and storage battery are the two active parts. The storage battery supplies the current for starting and also furnishes a reserve current for the electric lighting system. When the engine is running at a speed equal to 11 miles an hour the starting motor automatically becomes a generator that delivers a properly regulated charge into the storage battery.

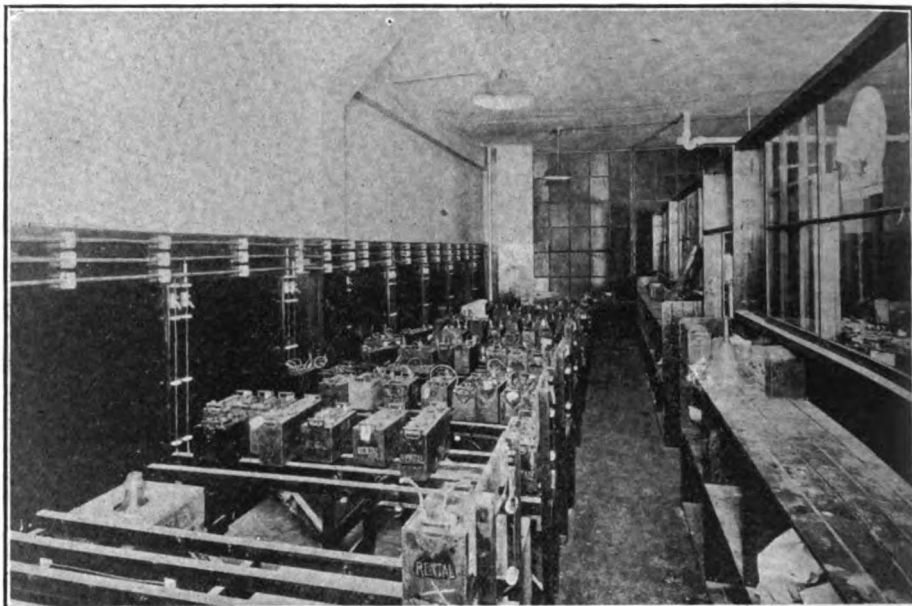
The lights are controlled from a small switch that is conveniently placed on the left side of the front heel board, and they take their current direct from the battery.

This motor-generator is not mounted so that its weight is carried by the Ford engine, but is placed in front of the radiator, its weight supported by the cross channel member of the car frame.

The equipment consists of the following: One 12-volt motor-generator, complete with the necessary brackets and nuts for mounting. One master switch for mounting on steering column for control of the operation of the motor in starting. One No. 8140 (12 S-35 R) 35 ampere-hour, 12-volt Eveready non-sulphating storage battery, one black enameled steel battery box (with locks) for installation on right running board. Necessary bolts for holding battery box, also porcelain bushings for protecting wires running from the battery, lighting switch (fused), with terminals properly marked, designed for mounting on heel board, and complete cables to make connections, cut to proper lengths.

NATIONAL AUTOMOBILE CHAMBER OF COMMERCE ELECTS OFFICERS.

The directors of the National Automobile Chamber of Commerce for the ensuing year, as elected at the annual meeting are as follows: Charles Clifton, Pierce-Arrow; Windsor T. White, White; K. H. Collins, Cadillac; C. C. Hanch, Studebaker; Hugh Chalmers, Chalmers; John F. Dodge, Dodge; Alvan MacCauley, Packard; William E. Metzger, Columbia; J. Walter Drake, Hupp; Carl Pelton,



The Pettingell-Andrews Battery Recharging Room Showing Extensive Equipment to Handle Rush of Business Promptly.

Maxwell; R. E. Olds, Reo; H. H. Rice, Chevrolet; J. N. Willys, Overland; Roy D. Chapin, Hudson; C. W. Churchill, Winton. Mr. Clifton was re-elected president.

POSSIBILITIES OF ALCOHOL AS PRACTICAL MOTOR CAR FUEL.

The National Automobile Chamber of Commerce is conducting a series of experiments to determine the value of mixtures of gasoline and alcohol as a motor car fuel. The supply of motor fuel could be greatly increased by the production of industrial alcohol on a large scale. Alcohol made from waste sulphite liquor from paper pulp mills is being used in nearly all automobiles operated in Norway and Sweden and alcohol is almost wholly used in Spain, where the sale of gasoline for use in passenger cars has been prohibited.

It is claimed that at the present time

alcohol can be produced at the paper pulp mills at a cost of 15 to 20 cents a gallon and if all the paper mills suitable for the purpose were equipped with the necessary plants they would have a combined capacity of 15,000,000 gallons a year.

Experiments have shown that alcohol can be blended with gasoline to produce a suitable fuel that will not cause the troubles usually encountered in starting a cold motor on alcohol alone.

PRICE OF NATIONAL CARS ADVANCED \$300 ON EACH MODEL.

Three hundred dollars has been added to the price of each of the different models in the 1918 line of the National Motor Car and Vehicle Corporation of Indianapolis.

The new prices, which went into effect June 1, are as follows:

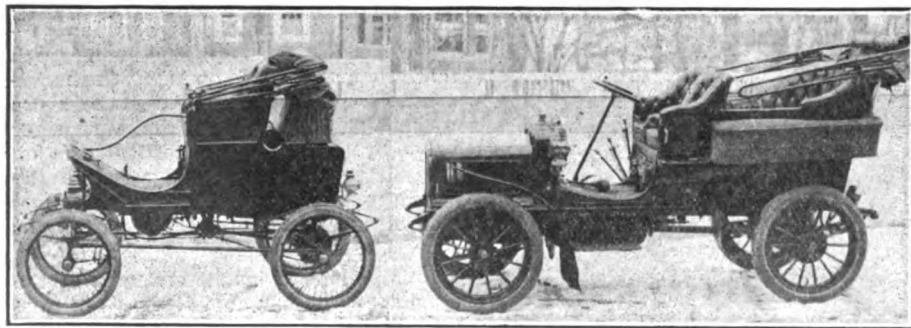
Six-cylinder touring car, four-passenger roadster or phaeton, \$2450; six-cylinder touring sedan, \$3120.

Twelve-cylinder touring car, four-passenger roadster or phaeton, \$3050; 12-cylinder, two-passenger dispatch roadster, \$3150; 12-cylinder touring sedan, \$3720.

A GOOD SHOWING FOR DIXON'S IN UNIONTOWN RACING EVENTS.

Dixon lubricated cars played a prominent part in the day's doings at the Uniontown, Pa., track, May 16, winning first place in all of the four preliminary heats. Tom Milton, driving a Duesenberg, won the first heat. Ralph Mulford, driving a Frontenac Special, won the second. Both use Dixon's in every race. So do Eddie Hearne and Louis Chevrolet, winners of the third and fourth heats respectively. Mulford won the final heat, Hearne came in second and Milton third. Thus Dixon's won the enviable distinction of being the lubricants used in every car to finish inside the money.

A Generation Ago In Motordom



This is the Second of a Series of Pictures Taken from the Files of the Automobile Journal Library, Which Are to Be Published as an Interesting Reminder of the Days When a Motor Car Was a Luxury and Not as Sturdy or Imposing a Vehicle as It is Today. At the Left is a Steam Stanhope Built in 1901 by the White Company of Cleveland, O., Which Was in Use up to Several Years Ago. The Car at the Right is Also a White, a Steam Touring Car of the 1905 Type, Which is Still in Daily Operation in Boston. The White Company Abandoned Steam Car Production Nearly 10 Years Ago and Has Since Manufactured Gasoline Cars Exclusively.



DRESSING A LEATHER CLUTCH.

If refacing the clutch appears to be too much of a job for the amateur, there is a method of restoring its efficiency which will generally prove satisfactory, but which also necessitates the taking down of the clutch. When the cone is removed it is placed upon a bench and the facing stabbed lightly with a small penknife or an awl, going over the entire surface, making numerous small holes. The facing should then be dressed with castor oil, which has more of a chance in working in than it would if it were applied to the unpunctured surface. Let the clutch stand over night and repeat the operation for two successive days. Then rub graphite over the surface with the back of some instrument having a hard, smooth surface like a tooth brush, rubbing the graphite vigorously into the openings made in the leather. This will form a sufficient, but not excessive lubricant, and the castor oil will soften the under side of the leather, affording a smooth and non-gripping clutch.

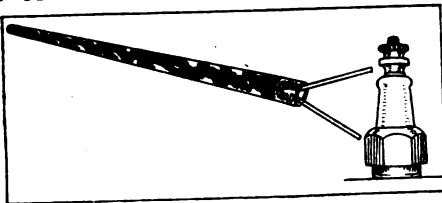


Figure 409.

SPARK PLUG TESTER. (Figure 409.)

A neat little spark plug tester can be made with an old penholder and a two-inch cotter pin. The points of the cotter pin are spread apart to the width of about one inch and some thin rubber bands wound about the eye. The filler plug which holds the pen in the penholder is pulled out and the cotter pin secured firmly into the hole. This little device if properly made will do away with chance shocks experienced in using a screw driver or other uninsulated tool.

FILLING AND TESTING BATTERY. (Figure 500.)

Without the proper utensils it is quite a difficult matter to find the level of the water in the battery and a handy method is to carry a glass tube in one of the

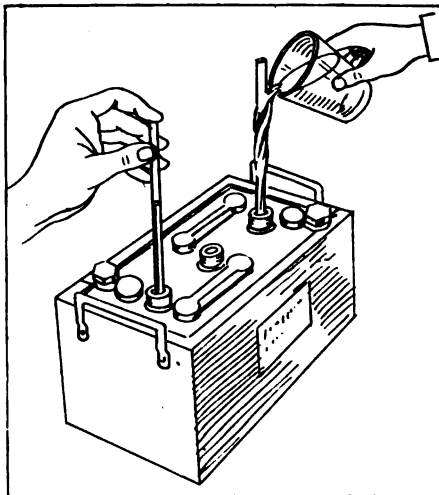


Figure 500.

door pockets. When it is inserted in the battery and the finger held over the top of the tube, the water level can be determined by raising it slightly and inspecting the depth of water in the tube. In filling the battery with water a steady hand is required to avoid slopping, but if the glass of water is held against the tube and allowed to flow downward it will follow the tube into the battery.

HOME MADE WHEEL PULLER. (Figure 501.)

If there is no wheel puller available when it is necessary to remove the wheel, a practical method is to wind a heavy strap about opposite spokes in the wheel and set the jack against the end of the axle with the boss of the jack in

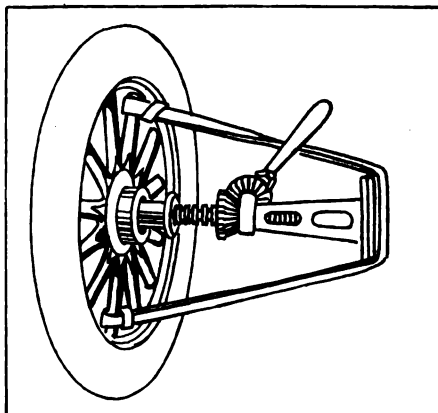


Figure 501.

the strap as shown in the cut. Lever the jack until it sufficiently tightens the strap and a few taps with a hammer on the base of the jack, which will suffice to loosen the wheel so that it may easily be pulled off.

ADJUSTING SHOCK ABSORBER. (Figure 502.)

A simple way to test the Hartford Shock Absorber, as given in the Haynes Instruction Book, is to take the absorber from the car and clamp the double arm of the absorber in a vise and pulling the single or free arm with a spring scale. The initial or factory adjustment indicated by the pointer being at zero mark upon the absorber dial is 25 pounds on the spring scale.

To reset the adjusting nut is turned back so that the indicator points to zero, then measure the pounds pressure as illustrated. If any variation from the above occurs, turn the adjusting nut in the direction necessary to secure the desired tension. Mark the ring or outer

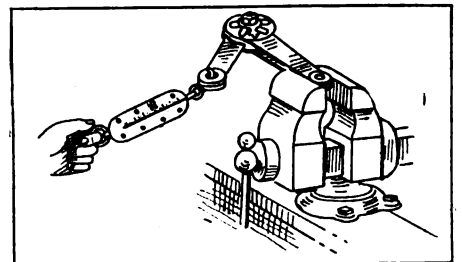


Figure 502.

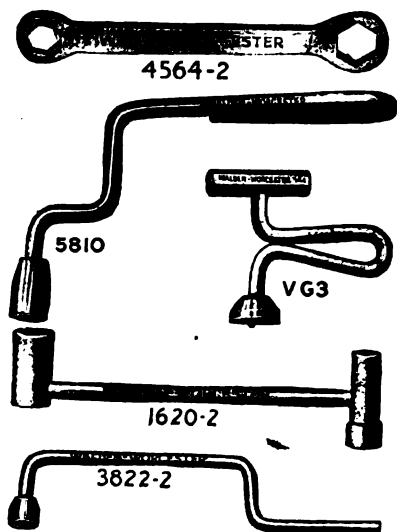
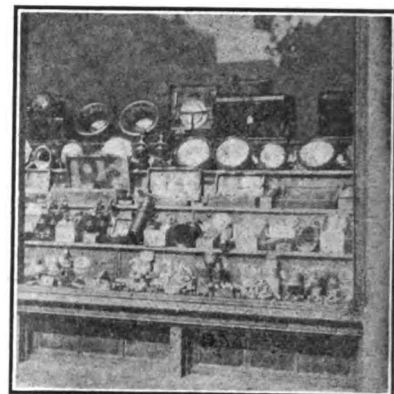
edge of the absorber opposite the pointer, turn the adjusting nut to the left until the dial is free, counting the revolutions of the wrench in doing so, then move the dial so the zero is opposite the mark on the ring, see that the spider spring is in its place and adjust the nut, giving it the same number of turns. The pointer should stop at zero.

REMOVING TIGHTENED NUT.

Sometimes when working upon the engine a nut fails to come off readily and the wrench slips, bruising the fingers and causing a loss of temper. One method of loosening it is to heat the wrench white hot and placing the wrench upon the nut allow it to remain for a few minutes. This will cause the nut to expand and should be easily turned off.



Accessories Department



Walden-Worcester Special Wrenches for Ford Cars have been tried out by garage repair men and Ford owners. They have been found to be most efficient tools—especially useful in getting at nuts and bolts inaccessible to ordinary open-end or monkey wrenches.

The ratchet wrench, No. 4564-2 with an 11/16 inch hexagonal opening, was particularly designed for use on transmission bands (brake and reverse), Ford car. The opposite end, 15/16 inch, is for use on Champion X spark plugs and slow speed connecting lock. This is a combination tool which has been found to be most serviceable. The price of this tool is 90 cents.

The Triple Socket Wrench, No. 1620-2, is really three wrenches in one. The socket sizes are 3/4 inch and 1 1/2 inch hexagon and 9/16 inch square. This is our new improved "Tomahawk" wrench.

The double-end socket has been designed particularly for clearance around cylinder head bolts and other places. Used on cylinder head, brake and reverse support, cylinder inlet and outlet connections, differential case, drive shaft roller bearing, front spring tie, spring, run board fender, rear axle housing, crank case

(lower cover), controller shaft bracket and 9/16 square socket on main bearing bolt head. The price of this tool is 60 cents.

The special type wire handle wrench, No. 3822-2, is used on flywheel cap screws, Ford car; heretofore considered an impossible place for a socket wrench. It is an ugly place made easily accessible. The socket size is 11/16 inch hexagon. It sells for 50 cents.

The all-steel wire handle valve grinder No. V63 has a 3/4 inch bar handle, which swivels on a cone bearing. The socket is shaped to fit valve heads and is fitted with hardened steel pins. The valve grinder sells for 45 cents.

Wrench No. 5810 is a specially designed connecting rod wrench. It fits all connecting rods on a Ford car, including the fourth connection. This is the original design, the first wrench made to reach the fourth connection without removing the engine from the car. It sells for 45 cents.

Manufactured by the Walden-Worcester, Inc., Worcester, Mass. Write for catalogue.

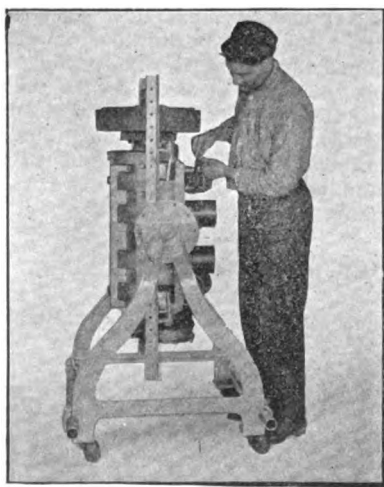


The **Holdford Brake**, as the name indicates, is designed primarily for Ford cars and may be used in addition to those on the car, or to take the place of either the service or emergency brake. This brake is made from the best of materials, the points where the greatest strain comes are drop forgings, and the lining is J. M. Non-Burn. It is so designed as to be efficient under all conditions, bringing full contact with the external surface of the brake drum, after the first adjustment, until the lining is completely worn out. It may be connected to the foot pedal by means of an equalizing bar, thus relieving the transmission of strain and furnishing a positive brake at all times. In using it on the hand lever the internal brake may be left inside the brake drum or thrown away, according to the car owner's pleasure. In applying the brake no changes in the car are necessary.

Manufactured by the G. H. Dyer Co., Cambridge, Mass. Price per set when applied to hand lever, \$10; for application to foot pedal, \$15.

The **Dyer Lightweight Piston** is designed to fill a want for a light yet strong piston for Ford cars by the owner who is remodeling his car. The piston is made of a specially tough metal carefully machined and has special oiling features. These pistons are made in standard and oversizes and are sold complete with wristpins and rings. Each piston weighs 2 1/4 pounds, or one pound less than the Ford piston. In addition to the extreme light weight is the feature of uniform balance; each piston is limited to a variation of two ounces.

Manufactured by the G. H. Dyer Co., Cambridge, Mass. Write for prices and literature.



Continental Motor Stand.

The **Continental Motor Stand** is universal handling the Ford engine or any three-point suspension engine from any kind of a passenger car, truck or tractor. The stand is portable and can be moved to adjust the engine in any position desired.

The engine is fitted to the stand in the same position that it is fitted to the chassis and all bolts and clamps necessary are furnished as complete equipment with the stand. It is adjustable in width from nothing to 30 inches. Has a five-inch adjustment in height and can be locked in over 25 different positions.

Manufactured by the Continental Auto Parts Co., Knightstown, Ind. Write for prices and literature.



Dyer Lightweight Piston.



Adamson Vulcanizer.

Dellon Cord Tread Tires are a new kind of pneumatic tire which is guaranteed to be permanently non-skid and adjustable on the basis of 7500 miles of service, tread being composed of a combination of rubber stock and fabric, with the fabric standing on edge so as to come constantly in contact with the road surface. This feature gives the tire its non-skid qualities. The tread construction of the tire is entirely different from any other, for the fabric is impregnated with rubber under a new process by which the rubber is drawn into the fabric by suction instead of forced in by pressure. Thus the bond between the rubber and fabric is claimed to be much closer than by the other process.

Manufactured by the **Dellon Tire and Rubber Co., Trenton, N. J.** Harry M. O'Brien, New England distributor, 245 Columbus Ave., Boston. Write for prices and literature.

The **Kahn Automatic Valve**, which is standard equipment with Armstrong tubes, is similar in outside size and shape to other tube valves. It is the internal construction that differs. Beneath the knurled collar indicated by the arrow at the top of the illustration is a graduated dial marked with five figures, 50, 60, 70, 80 and 92 pounds. The knurled collar is turned until a certain projection on its face fits into the slot above the figure indicated the pressure desired in the tube. An air supply is connected with the valve by the usual method. When the pressure in the tire reaches the desired figure the valve automatically closes and the air from the pump passes through a by-pass to the outside with a loud, whistling noise, thus giving warning that the tire has the desired pressure. The manufacturers claim that it is impossible to put more air into the tire after the pressure at which the valve is set for is reached.

Manufactured by the **Armstrong Rubber Co., Inc., 118 Adams St., Newark, N. J.** Prices upon request.

The **Dover Electrically Heated Soldering Iron** consists of a Vea heating unit tightly enclosed in a steel tube to prevent damage from careless handling. A flanged copper core runs the full length of this heating element and is connected with the soldering tip. Around the core is a vitrified clay tube upon which is wound the resistance coils. The Vea insulating material, which is said to be a non-conductor of electricity, but a good conductor of heat, is forced in between the vitrified tube and the copper core, and between the coils and the steel casing, under hydraulic pressure, which prevents all danger of burning out coils. The iron is so designed that the tips may be removed for replacement or for changing with other styles of tips. Irons may be obtained wound for any voltage ranging from 50 to 250, and in various sizes, for light and heavy work.

Manufactured by the **Dover Manufacturing Co., Dover, O.** Write for prices.

Genolite (standard six volt system) gives the Ford a constant and sure head and tail lights while running or idle. This system is easily installed as no machine work is involved. It is operated by a patented flat belt, positive and guaranteed generator drive with minimum wear. The lighting switch is conveniently located on the steering post with two positions—full touring and dim. This system can do double duty. In addition to furnishing lights it will give you ignition for your engine, two sources of current always available—one battery and one generator.

Distributed by automobile division, **Pettingell-Andrews Co., 100 Brookline Ave., Boston, Mass.** Write for prices and literature.



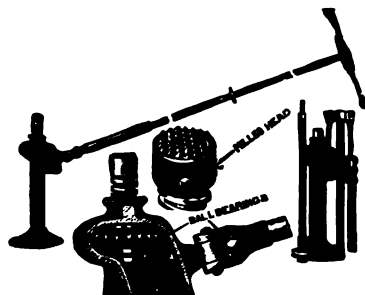
BATTERY TESTER



Dellon Cord Tread Tires.



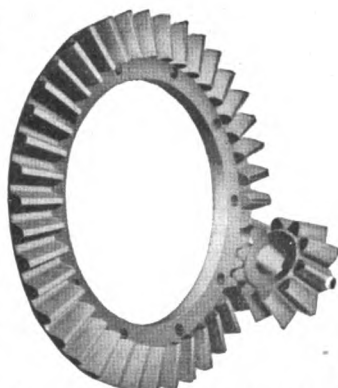
Dover Soldering Iron.



Kimball Jack



Auburn Valve Lifter.



Krom-Nik Anderson Special Gears.



Kahn Automatic Valve.

The **Kimball Ball Bearing Heavy Type Jack** eliminates dirty, hard jack work. Its long handle turns and raises or lowers the heaviest car with ease. Its rigid handle that is swung from the top, not the bottom, prevents it from falling over while being placed beneath the car and all the raising or lowering is done at the end of the long handle. The milled head of hardened steel on the top will hold anywhere, on any bolt, spring or clip. The ball bearings carry the lift and thrust, reducing the friction and making the jack work easily. There is nothing to get out of order and the entire jack folds up into a small bag.

Distributed by **Edward A. Cassidy Co., Inc., Madison Ave., at 40th St., New York City, N. Y.** Write for prices and literature.

The **Adamson Model E Vulcanizing Set** includes vulcanizer, can of Adamson dry fuel, a box of 12 patches, measuring cup, sand paper and directions.

While serving its purpose as well as any of the large outfits for vulcanizing, it is much handier and efficient, as it can be packed away in the car among the tools or in any small space and is ready for use at an instant's notice. With such a device in the tool kit the motorist can cease worrying about possible punctures.

Adamson Manufacturing Co., East Palestine, O. Price, \$1; extra box of patches, 25 cents; extra can of dry fuel, 50 cents.

The **"Break-Not" Storage Battery Tester** shows at a glance whether the battery is empty—half discharged—or fully charged. More than half of the instrument is made of red rubber, which eliminates breakage to a great extent. The instrument is guaranteed accurate and the scale is clearly and plainly marked.

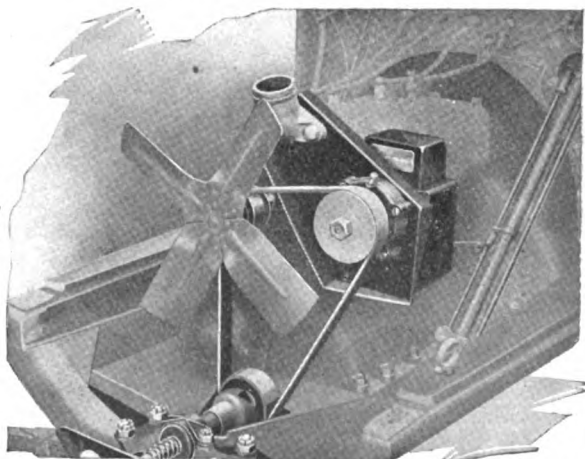
Manufactured by **E. Edelmann & Co., 119 W. 42nd St., New York City, N. Y.** Price, complete in mailing tube, \$1.

The **Krom-Nik Anderson Special Gear** for Ford cars offers the lowest possible ratio for hauling and hill climbing. It has a special type of tooth unlike any other and with an additional half pound in weight it gives remarkable strength and efficiency. The 4.2 to 1 ratio offers the lowest gear reduction possible in a Ford axle. The special racing 3 to 1 gears manufactured by this company are designed for owners who want extremely high speed for use in racing cars.

Manufactured by the **Krom-Nik Gear Co., Chicago, Ill.** Price, \$12.

The **Auburn Valve Lifter** is a so-called one-piece, self-adjusting valve spring lifter, made of malleable iron. The manufacturers claim that it cannot get out of order, as it has no hooks, springs or chains, and no separate pieces to become lost. It is made to fit valves of all makes of cars.

Manufactured by **Auburn Ignition Manufacturing Co., Auburn, N. Y.** Price, 75 cents.



Genolite Lights a Ford Through Battery and Generator.

The Badger "Two-Wheel Drive" Differential always applies the power on the wheel offering the greatest resistance. This means that the car is held steady and true to the line of drive. On a slippery surface, or when traveling in sand or mud, the wheels take the full power of the engine, thereby eliminating waste of power and wear on the tires through the spinning of one wheel. The car holds the road no matter how sharply crowned, muddy or slippery. The makers claim it is easily installed by simply taking out the three pinion gears and inserting the two Badger gears, using the same spider. The illustration tells the whole story. It is claimed that any Ford owner can do the work with his regular set of tools, or the garage can do it in from two to three hours. An attractive offer is made distributors and dealers to handle the Badger Differential.

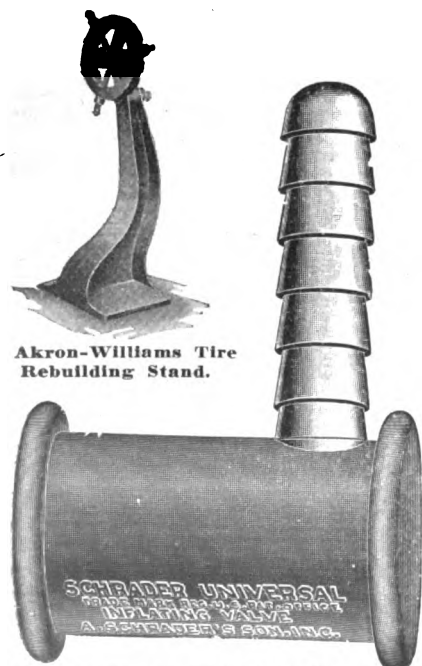
Manufactured by the Lewis Differential Co., Milwaukee, Wis. Write for prices and literature.

The Mosco Tire Rim Tool shown in the illustration is a handy accessory for the car operator using a machine equipped with split rims. This tool is designed to be hooked over the rim. When so applied and the turnbuckle turned the rim is opened, making the replacement of a tire an easy matter. This tool may also be used for expanding the rim after the tire is applied by reversing the process, the untwisting of the turn buckle exerting sufficient pressure upon the rim to expand it.

Manufactured by the Mosco Specialties Co., Waltham, Mass. Price, \$2.50.

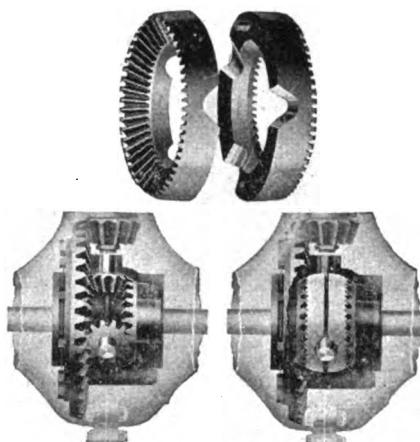
Pedex, a pedal extension device, makes it possible for two persons of different height to drive the same car with equal comfort. Pedex is designed to be attached to both the brake and clutch pedals, and the use of the permanent pedals is in no way impaired. Two adjustments are possible, so that the foot may be placed in a position of greatest comfort. In touring this article is a great help to the driver, making it possible for him to rest his feet by shifting to a new position.

Manufactured by American Car Accessories Co., 529 West 21st St., New York, N. Y. Price, \$5 per pair.

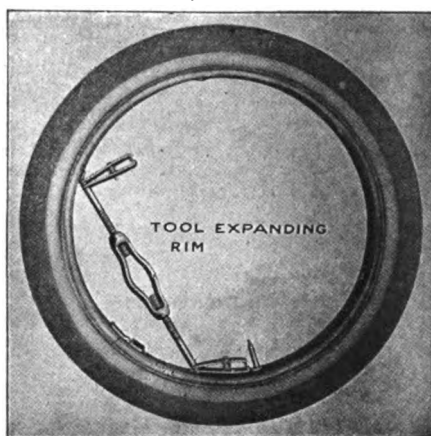


AKRON-WILLIAMS Tire Rebuilding Stand.

Schrader Automatic Inflating Valve.

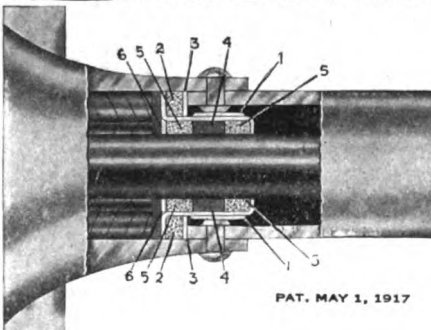


Badger "Two-Wheel Drive."



Mosco Tire Rim Tool.

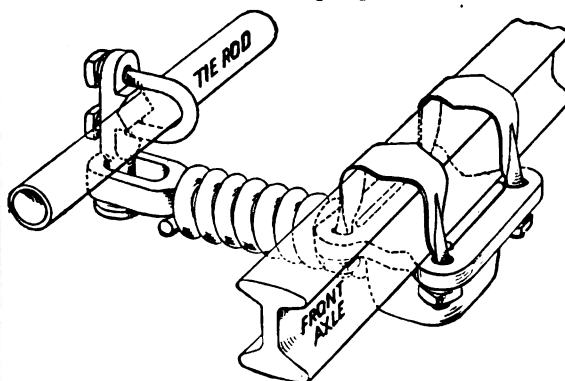
Shurnuff GREASE RETAINER



1. Steel Cup. 2. Large Felt Washer. 3. Large Steel Retaining Ring. 4. Asbestos Washer. 5. Small Felt Washers. 6. Small Steel Retaining Ring



The Cochran Spring Oiler.



The D. & O. Anti-Wobbler.

The Akron-Williams Tire Rebuilding Stand is designed for the tire repair shop, used on retread jobs and major sectional repairs. It is similar to stands used for hand operations in tire factories. Unlike the latter, however, it takes up a minimum of floor space and is much lighter in weight without sacrificing convenience or strength. A new feature is the spring ratchet attachment, which permits the tire being turned either way at will, or being locked rigidly in any desired position.

Manufactured by the Williams Foundry and Machine Co., Akron, O. Price \$30.

The Schrader Automatic Inflating Valve makes the bottled air lock itself into the tank. When filling the tire the valve is pressed against the valve stem and when the desired pressure is obtained the removal of the valve automatically cuts off all air leakage from the tank. It is made to fit any diameter of hose from $\frac{1}{4}$ inch to $\frac{5}{8}$ inch.

Manufactured by A. Schrader's Son, Inc., 800 Atlantic Ave., Brooklyn, N. Y. Write for prices and literature.

The D. & O. Anti-Wobbler is a simple, substantial device for preventing the wiggle and jiggle of the Ford steering wheels. It is easily attached to the center of the front axle in a few minutes and the makers claim it to eliminate driving accidents by holding the front wheels true at all times, thus preventing loss of control.

The G. H. Dyer Co., Cambridge, Mass. Write for price and literature.

Shurnuff Grease Retainer for Ford axles consists of three felt washers, one rubber asbestos washer, a cold drawn steel cup and two retaining rings. The retainer remains stationary, the two rivets that are already in the axle preventing it from turning. The company furnishes a counter display free to dealers with each dozen pairs.

Manufactured by the Shurnuff Manufacturing Co., St. Louis, Mo. Price 90 cents per pair.

The Cochran Spring Oiler affords an easy and simple method of getting oil between the springs of the car. To use, the car weight is lifted from the springs by means of jacks and the oiler simply inserted between the spring leaves and the oil squirted into the groove of the oiler, from which it flows to the lubricating points.

Manufactured by the Cochran Pipe Manufacturing Co. Write for price and literature.

The Martin Inner Tube Cases, made for either one or two tubes, are of water proof enameled cloth and offer protection against light as well as abrasion. They offer a practical solution to the exposure problem and pay for themselves by preserving tubes and saving the patience of the autist.

Manufactured by the Martin Manufacturing Co., Lancaster, O. Price for single tube case, 35 cents; double case, 50 cents.



Pedex Pedal Extension.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.

9 PARK STREET, BOSTON, MASSACHUSETTS

The Traffic Cop Will Get You If You Don't Watch Out

Unusual Vigilance Being Shown in Prosecuting Violators of Speed and All Other Regulations

UNUSUAL vigilance is being shown throughout the New England states by the authorities in prosecuting violations of the highway laws relating to the operation of motor vehicles and unless every precaution is taken to observe the strict letter of the law automobile drivers are more likely than ever to find themselves in its clutches.

It is difficult to give accurate information as to the location of the active traps, as it is customary to move them about from day to day to different sections of the highway, but if the motorist will keep in mind the list of places where the traps are most frequently located, he will avoid much trouble and expense. In the list compiled for the members and published below, the location of some of the most active traps in New England are given. Traps are not always operative at these points, but have been frequently in the past, and undoubtedly will be again, following out a fixed policy of the police authorities in shifting trap operations around to make the regulations effective in all localities.

Trap Locations

Boston, Mass.—Commonwealth avenue and Boylston street, between Charles street and Massachusetts avenue; Columbus avenue from Boylston street to Dudley street; junction of Commonwealth and Brookline avenues and Beacon street; Commonwealth avenue, be-

tween junction and Chestnut Hill avenue; Beacon street, between junction and Chestnut Hill avenue; Massachusetts avenue, between Washington street and Columbia road; Columbia road, between Massachusetts avenue and Blue Hill avenue; Blue Hill avenue, between Columbia road and Centre street; Walk Hill street, between Hyde Park avenue and Blue Hill avenue; Norton street, between Washington street and Blue Hill avenue; Seaver street, between Washington street and Blue Hill avenue; Brook street, between Mattapan street and Canton avenue; Mattapan street, between Blue Hill avenue and Canton avenue.

Chelsea, Revere and Everett, Mass.—Revere Beach Boulevard.

Arlington, Somerville and Cambridge, Mass.—Massachusetts avenue.

Watertown, Mass.—Main street.

Roslindale, Mass.—Junction of Metropolitan avenue and Washington street.

Lawrence, Mass.—On main highway to Ayer, Mass.

Lancaster, Mass.—On main highway to Ayer, Mass.

Between Wayside Inn and Marlboro on the road to Worcester the traffic regulations are being strictly enforced.

Waltham, Mass.—Speed trap on Main street; do not exceed 15 miles an hour.

Woburn, Mass.—Speed trap between Mt. Vernon street and railroad crossing.

Ayer, Mass.—Speed trap on main route

to Camp Devens. Drive at reasonable rate throughout the city.

Jamaica Plain, Mass.—Slow down to eight miles an hour and sound horn on Canterbury street, at intersection of Walk Hill street.

Nashua, N. H.—Speed traps on main routes leading to northern summer resorts on Saturdays and Sundays.

Pawtucket, R. I.—Motorcycle policeman active on main thoroughfares leading through city from northern points to southern points; reasonable speed should be observed on Main street, West avenue, Broadway, Central avenue, Pawtucket avenue, East avenue, Newport avenue and Prospect street; special caution should be exercised on Main street and East avenue, which streets lead into North Main and Hope streets respectively in Providence, where the police are constantly vigilant.

Providence, R. I.—Speed trap operative on main thoroughfares out of city to following points: Newport, Narragansett Pier, New York and Connecticut. Do not exceed 15 miles an hour on Hope, Waterman, Angell and Broad streets, or on Elmwood avenue, Broadway, Reservoir avenue or North Main street. Motorcycle policemen also on duty to suppress speeding.

Connecticut—State and local police active throughout the state and unusual vigilance is being shown toward operators who violate any section of the law.

New Hampshire and Vermont Police Adopt Rules

At a meeting of the heads of the police departments of a number of New Hampshire and Vermont cities held in White River Junction, Vt., last month, it was agreed to uniformly enforce traffic laws and regulations practically the same in all towns and cities. The places represented at the conference were: Hanover, N. H.; Lebanon, N. H.; White River Junction, Vt., and Windsor, Vt.

The following violations will be strictly enforced in those cities:

1st—Speeding in and outside of town limits.

2nd—Glaring headlights and spotlights.

3rd—Automobiles and teams not lighted at proper time.

4th—Not giving warning of approach at intersecting street by sounding horn.

5th—For having cut outs or mufflers open while operating in towns.

6th—All vehicles when stopped to be on the right side of the highway and close to the sidewalk.

7th—Slow moving vehicles to keep close to the right side of the highway.

8th—When traffic officers are stationed at intersecting streets, to give warning of approach, and show the direction you intend to go by extending arm in that direction, and not pass officer until signaled by him to do so.

9th—Special attention to be given to motorcycles for speeding, and cutouts open and lights.

It was also agreed that all officers keep a record of autos and operators who violate the laws and to send a report to each chief once a week, that each one may know who the habitual violators are.

"When you have reason to caution an operator for any violations," the agreement states, "tell him that he must expect to be held up and treated the same in any of our towns for violations, and that a record is kept of his name, and that if his name appears more than once he may expect to be dealt with according to the law.

"Request all operators on the highways to report to the nearest officer anyone who is known to be a reckless operator, or known to operate his car while under the influence of liquor.

"It was also agreed to have the newspapers of our towns print the regulations that will be enforced in all these places and to make notes for other papers to copy that strangers coming to or through our towns will not be ignorant of what to expect if they violate the law."

With this action announced it completes the campaign that is to be waged throughout New England against all forms of reckless driving.

DETOURS TO DOVER, N. H.

Motorists desiring to reach Dover, N. H., either enroute to the White Mountains or to Portland, via Dover, will have to use the secondary route via Haverhill, Amesbury, to Exeter, thence to Dover, because the bridge at Dover is washed out and will not be replaced for some time. The route via Plaistow is not as good as the Amesbury route and we do not recommend it for that reason and motorists should not use the Hampton route to Dover.

OWNERS RIDING WITH DRIVERS RESPONSIBLE.

According to a unanimous decision recently rendered by the Appellate Division of the Second Department of the Supreme Court, New York state, any owner who is riding in his car with a chauffeur, if the latter be convicted, is equally guilty.

Upon the receipt of the decision at the traffic court yesterday Magistrate House said:

"The decision is of the greatest importance to the motoring public, which should lose no time in getting acquainted with it. It is a long step forward in safeguarding life and limb of the careful motorist, as well as the pedestrian, and should have a salutary effect in curbing habitual speeders and owners who are in a hurry. The thanks of the community are due the district attorney of Kings county."

Presiding Justice Jenks, who wrote the opinion, says the purpose of the ordinance is to protect life and limb from vehicles driven in the streets.

"For this purpose," the opinion declares, "not only is restraint put upon the person who drives the vehicle, but also upon its owner, who, in the nature of things, controls the driver. In effect, the ordinance holds the master to the control of his servant.

"The sole defense is the owner's statement that, although he was in his vehicle, 'I didn't know whether we were going fast or not. I was talking to my wife.' If this were a defense then the owner of the vehicle could always escape the obligation of the law by the plea of his disregard of his obligation in that he was voluntarily occupied in some social function, or even that he was asleep or wool gathering. Thus the owner would be careful to shut his eyes for immunity, lest with them open, he might be convicted."

SUSPEND GARAGE LICENSE.

The Massachusetts State Highway Commission suspended the license of a Springfield garage for 15 days as a penalty for permitting the use by outsiders of registration plates issued to that garage. This was the first suspension for a violation of that nature and attracted considerable interest in motor circles, as it is said the practice has been general.

Act Wisely When In the Hands of the Law

Don't be impertinent to the traffic officer. Be courteous, even if it is painful. The summons saves you the humiliation of being locked up and waiting for bail.

Don't argue with the traffic officer about the laws or the particular section he charges you with violating. He didn't make the laws. And anyway you may find that the officer overlooked another charge that might be placed against you.

Don't tell the traffic officer that you are a friend of some one or that the chief went to the same school with you. Never brag about your pull, because the fellow who does never has it when needed. If you do happen to know any of the above keep it to yourself and slip it quietly when the officer who arrested you is not around, and they will probably fix it for you that you don't have to serve more than six months.

Don't be insolent to an officer or try to intimidate him, because oftentimes in court the judge will ask about your behavior, and I assure you it will not stand you in good stead.

Don't go in with a lighted cigar or cigarette in your hand; they have no place in a court room.

Don't tell the judge you voted for him at the last election.

Don't try to make the traffic officer out a liar. This is, without a doubt, the most serious offense you can commit when being tried for a traffic violation.

Don't say your speedometer was out of order.

Don't say your car can't go as fast as the officer testifies, because you will be in wrong right from the start.

Don't, if you happen to be a woman, walk up looking peeved. Give the judge a sweet smile and he will immediately sit up and take notice.

Don't tell the judge you were speeding to the assistance of a sick friend, unless you are a doctor, and if so, be sure to bring your patient into court to corroborate your statement.

Don't say you were hurrying to catch a boat or train; these two are so old they have long whiskers.

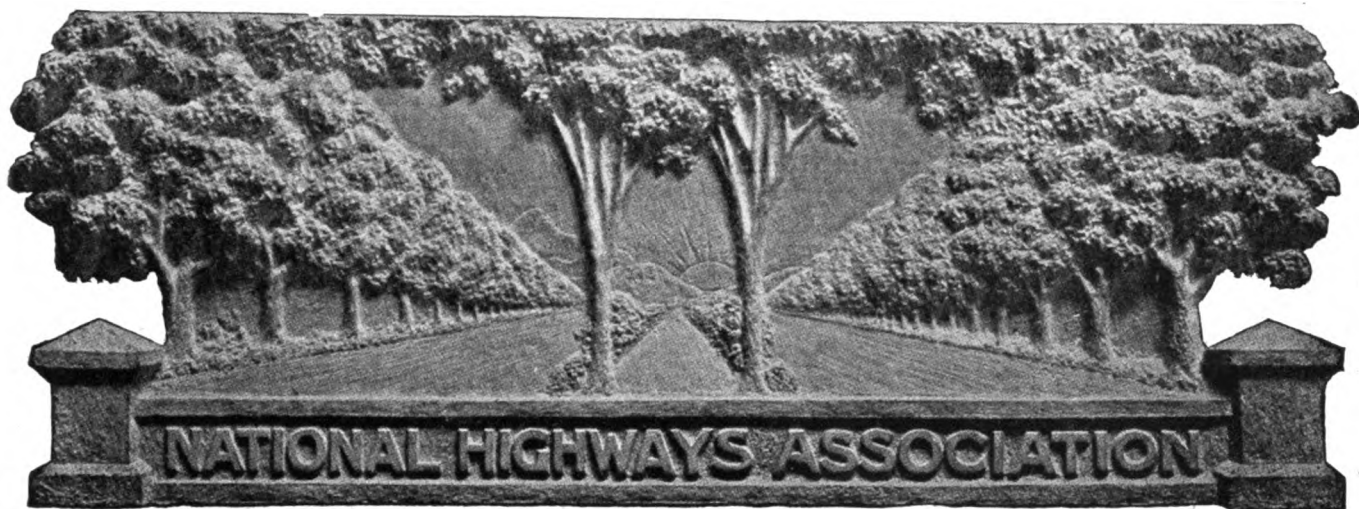
Don't say your muffler was making a loud noise and the officer thought you were going fast.

Don't say you didn't know that you had to keep your cutout closed during the day. It must be closed all the time.

Don't, if the judge asks you what have you to say to this charge of speeding, answer "nothing," or "I haven't anything to say."

Last, but not least, if you have never been arrested before be sure to tell the judge that this is your first offense and the first time you have ever been arrested for violating the traffic law.

—Chicago Tribune.



Secretary Hugo Discusses New Highway Law

"Will Have to Have Fewer Accidents or We Can Expect Legislation So Drastic That It Will Be Burdensome to the Motorist."

Secretary of State Francis M. Hugo, New York state, speaking at a dinner tendered him by the Automobile Club of America, declared that cooperation and true citizenship was really the solution of the motor vehicle problem in the state and described what has so far been done by his office and Legislature in the enactment of the headlight law which will soon be in force and which is expected to do away with much of the annoyance and danger attributable at the present time to the glaring headlight. Mr. Hugo stated that about 25 different concerns had already submitted lights and lighting devices, and that the first test would be made within the next few days. Following the result of such test, certificates are to be issued to such concerns as are marketing lights meeting the requirements of New York state's new law.

He said every effort would be made to acquaint the motorists of this state with the lights that comply with the law and that lists giving the names of these lights would be sent to all automobile clubs, police officials, justices of the peace and others, in order that the law might be lived up to in a comparatively short time.

"Two alternatives are now presenting themselves," he said. "We have got to have fewer accidents or we can expect legislation so drastic that it will be burdensome to the motorist, bearing heavily on the careful driver as well as the reckless party who is really responsible for a large percentage of the accidents. There is no question but that the pedestrian is frequently at fault, but the main fact remains that we must do something and when I say 'we' I mean the motorist and the pedestrian as well.

"We have our safety-first propaganda and I am of the opinion that it has been beneficial, yet it has failed to reach thousands of motorists and pedestrians who do not give it so much as a thought. Just

now we are releasing a film throughout the state which shows in a vivid manner how many of the motor vehicle accidents occur and how the same could have been avoided by the use of a little care. We are working to instill the idea of safety first in the minds of our school children, believing that it will become a part of that child's education, and as such will cause him to exercise greater care in crossing the streets through the years to come. Thousands of children have become careless in the face of ever present danger solely through familiarity with the motor vehicle and as direct result many are killed or crippled.

"I am of the opinion that unless something is done in the very near future to lessen accidents in which the motor vehicle figures, that there must necessarily come drastic legislation, which may serve the purpose, but which will fasten itself on the motorists regardless of whether or not they are careful drivers."

KEEP RECORD OF TIRE SERIAL NUMBERS.

"The Goodrich company and most of the other large manufacturers of tires place serial numbers on each tire. Through these numbers can be traced not only the material in the tire, when the tire was made, but on what machine and what workmen handled them.

"It would be an easy matter for the thief to chisel off the serial number, but in so doing he would decrease the value of the tire 75 per cent. Bases for adjustments are available only on tires with serial numbers. Thus the importance of a record of the tire's number is obvious. Stealing tires without numbers would be a profitable undertaking for the tire burglars.

"Police officials in big cities state that the identification of one tire very often leads to the recovery of scores of others.

Not only are tires, but stolen automobiles as well, recovered by tracing tire serial numbers.

"The percentage of tires recovered would be swelled amazingly in the United States if automobilists would make a record of tire numbers. Hundreds of stolen cars would be reclaimed, also scores of auto thieves apprehended.

MOTOR CAR OWNERS ARE LIABLE TO THEIR GUESTS.

The Appellate Division of the Supreme Court of the State of New York has made a decision, which if upheld will materially increase the liability of automobile owners for injuries to guests resulting from their chauffeur's negligence.

Judgment for \$4000 with costs was awarded the plaintiff in the case. Justice Kelly, who wrote the opinion, brought out the following points:

"The only matter on which there is any difference of opinion among the members of this court is whether the rule of respondeat superior applies in this case as between the appellant and her chauffeur so as to make her liable for his negligence. The learned trial justice charged the jury that a master is responsible for the acts of his servant within the scope of that servant's employment, and if the servant be negligent and that negligence results in an injury to a third person, that third person has a cause of action against the master, and that in this case if appellant's chauffeur was negligent she was chargeable with such negligence.

"That the owner of a vehicle inviting another to ride with him as a favor nevertheless owes some duty to his guest, cannot be disputed. He cannot willfully injure him or expose him to unnecessary or unusual dangers. Nor can it be disputed that in such case the owner would be responsible for his own personal negligence in caring for his guest."

PLATE TWENTY-THREE

GARAGE REPAIR SHOP AND ACCESSORY STORE

Suitable Structure for Housing a General Automobile Business
Under One Roof with the Most Advantageous Appointments

(Designed by the Architectural Department of the Automobile Journal Publishing Co.)

THE garage, repair shop and accessory end of the automobile business are all closely related and when handled by one person can be operated most profitably by having the three branches (which at present happen to be the most lucrative end of the business) housed in one structure. With this object in view the accompanying plan, for what might be termed a general automobile business building, is submitted. It provides for housing all three branches of the business, as well as a roomy office for the proprietor and clerks.

Appointments are such that a profitable garage business is possible, while at the same time a sufficiently large repair room with space to work on two cars, enables the owner to keep several mechanics employed, making this end of the business also profitable. The show room in front is ample for as large a line of accessories, supplies and equipment as one would expect to carry if not engaged in that business exclusively.

The main structure is of brick with cement block trimmings and wooden roof. It is 40x96 feet, providing approximately 3800 feet of floor space. These dimensions make it adaptable to the average city lot, which is of 50x100 feet, and with a few modifications it can be made suitable for a corner site with entrances on both streets.

The main walls are of brick, 12 inches thick, built up on the underpinning of the foundation walls, which should be at least 18 inches thick and extending below ground four feet. As shown in the elevation the front wall is carried above the roof line and stepped down on either side as a means of improving the exterior appearance of the structure. The roof is supported on a truss structure built up of 8x12 inch hard pine timbers, which rest on plates 12x18 inches of $\frac{5}{8}$ -inch iron placed in the wall eight inches. One and two-inch wrought iron rods are used in the construction of the truss, the larger sized rod being used at the center and two smaller ones on either side of it at a point half way to the walls. The roofing unit is made up of 2x7 inch rafters, with $\frac{7}{8}$ -inch matched boards and three-ply roofing paper. This form of roof is essential in the construction of large garages, as it eliminates the need of center poles that would hamper the convenient

maneuvering of the machines when driving in and out of the building or backing into position.

Ample entrance is afforded through the large 10 foot doorway, which is closed with two swinging doors swung on Stanley garage hinges. The hinge set shown is model "A," especially designed for brick, concrete or other construction requiring large offset ($2\frac{1}{4}$ inch). The set comprises three pair of ball bearing hinges, one pair of door holders, top and bottom locking Cremone bolt with staples, extra heavy duplex latch and padlock hasp or six-inch extra heavy cased bolt.

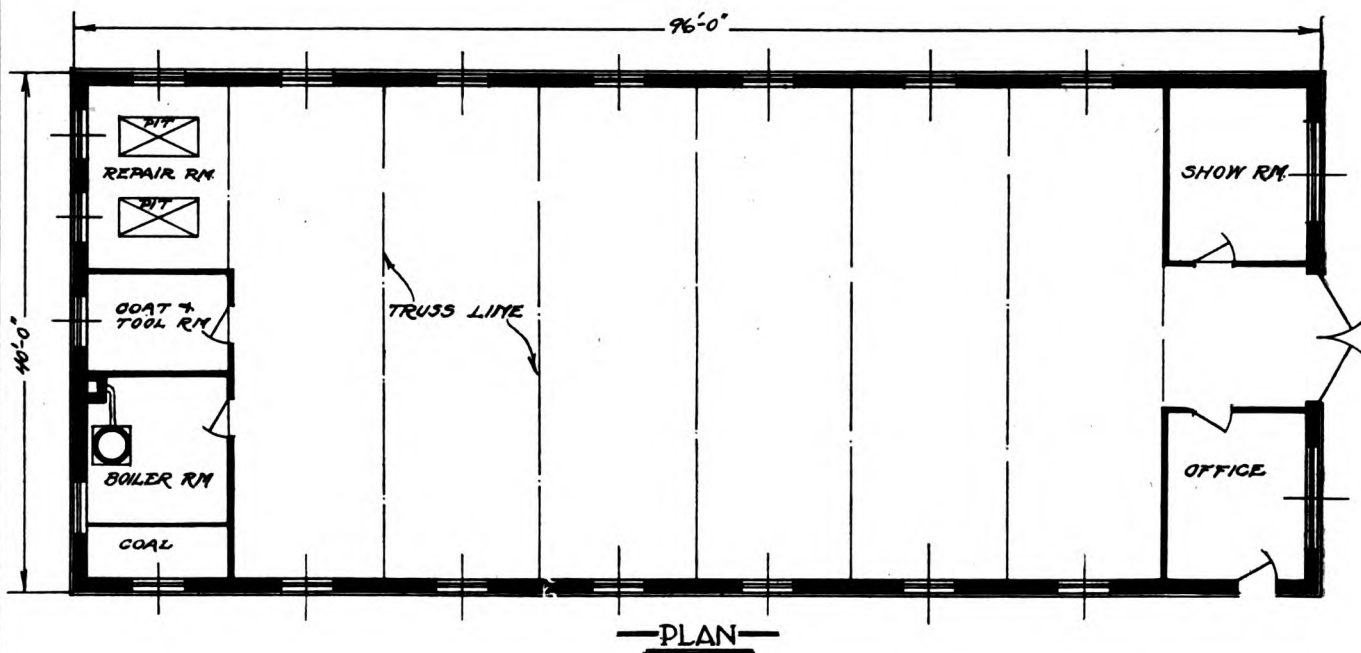
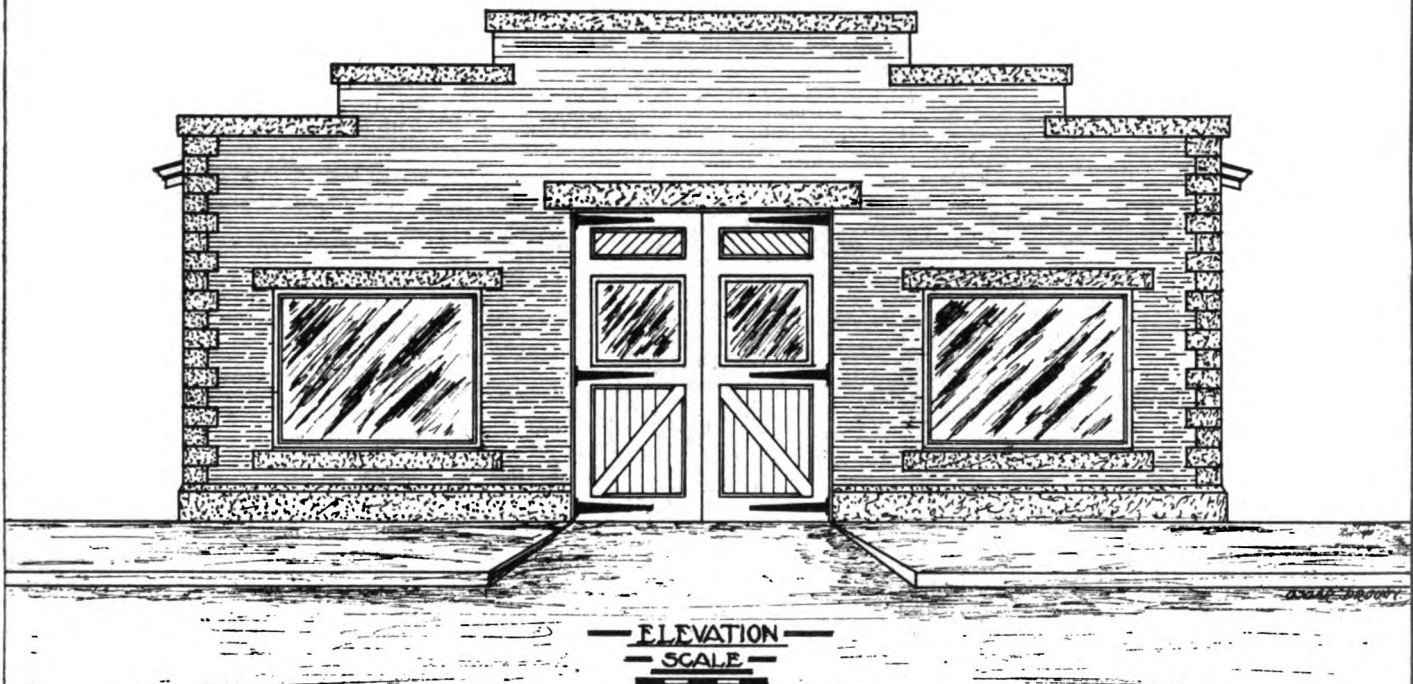
Large single pane window sashes in the upper panels of the doors improve the appearance of the entrance, while also admitting light to the front of the garage proper, which is shut off from light except at the back and sides by the stores on either side of the entrance. Single pane sashes are also used in the large windows in the show room and office, as they permit a more advantageous display of merchandise.

The boiler room as shown on the plan is amply large for the installation of a small heating system, using either steam or hot water to keep the entire structure warm. This is an essential feature in a public garage, as customers not only demand that their cars be kept in a warm building during the cold months, as a means of preventing damage to the cooling systems, but also for the reason that they avoid the usual starting trouble experienced with chilled engines.

A building of this type should have a concrete floor at least four inches thick laid on well tamped cinders, and before it is laid provision should be made for the entrance of the various pipes and conduits necessary in establishing the drain and feed connections for the water lighting systems, and it is also a good plan, when casting the floor to have the dimensions of the bases of the lathe, emery wheel and drill so that timbers can be sunk into the wet cement in the proper places to receive the lag screws with which the machines are secured in place.

Cost of a building of this type would vary according to labor conditions and the accessibility of a supply of material, but at the outside, even under present building conditions, it should not represent an expenditure of over \$10,000 when completed and equipped.

PLATE XXIII



CHAMPION "MINUTE" SPARK PLUG CLEANER SIMPLE TO OPERATE.

Anyone who is at all familiar with the inner workings of a motor car, motor boat, or, in fact, any type of gasoline engine, knows that a clean set of spark plugs will often smooth out so-called "engine troubles," while the reverse is true if the spark plugs are allowed to foul up and remain in the motor indefinitely.

Heretofore the cleaning of spark plugs has always been a long, nasty, mean job. The majority of car owners, rather than undertake the work themselves, would go without the use of their car for a day or two, besides paying a good price for having the plugs taken out, dismantled, cleaned and overhauled.

Now it is different. Spark plug clean-

ing has been simplified to the point where even a child can do it. A new device, known as the Champion "Minute" Spark Plug Cleaner, seems to have solved the problem.

This little device consists of a glass tube containing 50 loose, hardened steel needles. One end of the tube is open and fitted with a rubber bushing into which a spark plug can be screwed in exactly the same manner as it is screwed into the cylinder of a motor.

That's all there is to the cleaner itself and the operation of cleaning is no trick at all. The tube is half filled with gasoline, the plug screwed into the bushing, then shaken vigorously for a minute or two and the plug is cleaned in less time than it takes to tell about it.

When the tube is shaken it starts the needles in motion and they peck away at the inner surface of the plug where the carbon has accumulated. Every time a needle strikes it picks off a small par-

ticulate of carbon deposit and with 50 of them digging away the carbon disappears like magic. While the needles are removing the carbon the gasoline washes it away and dissolves the accumulation of oil, leaving the plugs clean, fresh and good as new.

The beauty of this little device is the fact that it makes a short, clean job of a long, mean one. The plugs do not have to be taken apart, soaked in gasoline and scraped in order to remove the carbon. That was a dirty job that consumed one's time and patience and necessitated a pair of overalls or the sending of a suit to the cleaners.

The Champion Spark Plug Co., Toledo, O., manufacturers of this novel automobile accessory, claim the demand for these cleaners has been so great that

the continuance of the war, it is forbidden to import automobiles costing \$1200 or more F. O. B. the place of manufacture, without a license from the Ministry of Munitions recommended by the War Trade Board.

ELGIN MOTOR CAR CORPORATION ADVANCES PRICES \$70.

The Elgin Motor Car Corporation, Chicago, Ill., has announced an increase of \$70 in the price of the four-passenger roadster and five-passenger touring models. The new price on both models is \$1165, both having formerly sold for \$1095. The Military Scout and All-Weather sedan are unchanged in price, selling at \$1195 and \$1645 respectively.

CHALMERS MOTOR CAR CO. ANNOUNCES RAISE IN PARTS.

The Chalmers Motor Car Co., Detroit, Mich., has announced a new price schedule for parts of Chalmers cars, which became effective June 1.

TRICOLORED LIGHTS SHOW DIRECTION OF CAR.

An automobile direction indicator with which the driver of the car may warn traffic by means of colored lights of the direction he wishes to take, is the invention of Joseph Sanna-Ser of New Orleans, La., who has applied for patents.

This device consists of a reflector to fit over the ordinary automobile lamp casing, which is supplied with five electric lamp sockets. At the sides are fitted red bulbs, at the top a green one and at the bottom a blue one. In the centre is a white light. When in operation the white light shows all the time and the others are shown at the will of the car driver. Contemplating a turn to the left a red light is shown. The reverse would indicate a turn to the right. The green light showing above the white would indicate the car running at emergency and at speed while the blue light showing below the white would mean that a stop is to be made. A direction indicator at the back of the car would work in unison with the one over the headlight.

CONTINENTAL GUARANTY CORPORATION DIVIDEND.

The Continental Guaranty Corporation, New York City, has declared a regular quarterly dividend of two per cent. for the quarter ending March 30, 1918, payable to stockholders of record as of April 27.

R. F. Wingard, vice president of Guaranty Banking Corporation of Chicago, has been elected an assistant treasurer of the company.

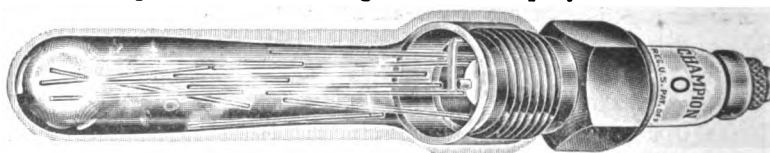


A Fascinating Display of Dixon's Automobile Lubricants in Accessory Dealer's Window, Featuring Its Popularity with Race Drivers.

they have had to increase their production program several times since the first of the year.

CANADA EXCLUDES THE HIGH PRICED AUTOMOBILE.

Canada has practically excluded the high priced automobile and in fixing the price of \$1200 and over as the figure at which a car becomes a luxury practically places an embargo on this class of machines. Under the terms of An Order-in-Council, which includes automobiles among nearly 1000 other articles which are classed as being non-essential during



Champion "Minute" Spark Plug Cleaner Showing Glass Tube with Cleaning Needles.

Identity of the Liberty Engine Made Known

War Department Makes Official Announcement Revealing The Different Makes of Cars Upon Which the Designs For the Various Parts Were Based

The mystery of the origin of the Liberty Motor and where the credit belongs for the design of the various parts has been cleared up by an official announcement made by the War Department, giving full facts, as well as description of parts of the engine. The report is as follows:

"The designs of the parts of the Liberty engine were based on the following:

"Cylinder—The designers of the cylinders for the Liberty engine followed the practise used in the German Mercedes, English Rolls Royce, French Lorraine Dietrich and Italian Isotta Fraschini before the war and during the war. The cylinders are made of steel inner shells, surrounded by pressed steel water jackets. The Packard company by long experiment had developed a method of applying these steel water jackets. The valve cages are drop forgings welded into the cylinder head. The principal departure from European practise is in the location of the holding-down flange, which is several inches above the mouth of the cylinder, and the unique method of manufacture evolved by the Ford company. The output is now approximately 1700 cylinder forgings per day.

"Camshaft and Valve Mechanism Above Cylinder Heads—The design of the above is based on the Mercedes, but was improved for automatic lubrication, without wasting oil, by the Packard Motor Car company.

"Camshaft Drive—The camshaft drive was copied almost entirely from the Hall-Scott motor; in fact, several of the gears used in the first sample engines were supplied by the Hall-Scott Motor Car company. This type of drive is used by Mercedes, Hispano-Suiza and others.

Angle of 45 Degrees.

"Angle Between Cylinders—In the Liberty the included angle between the cylinders is 45 degrees; in all other existing 12-cylinder engines it is 60 degrees. This feature is new with the Liberty engine, and was adopted for the purpose of bringing each row of cylinders nearer the vertical and closer together, so as to save width and head resistance. By the narrow angle greater strength is given to the crank case and vibration is reduced.

"Electric Generator and Ignition—A Delco ignition system is used. It was especially designed for the Liberty engine, to save weight and to meet the special conditions due to firing 12 cylinders, with an included angle of 45 degrees.

"Pistons—The pistons of the Liberty engine are of Hall-Scott design.

"Connecting Rods—Forked or straddle type connecting rods, first used on the French De Dion car and on the Cadillac motor car in this country, are used.

"Crankshaft—Crankshaft design followed the standard 12-cylinder practise,

except as to oiling. Crank case follows standard practise. The 45 degree angle and the flange location on the cylinders made possible a very strong box section.

"Lubrication—The first system of lubrication followed the German practise of using one pump to keep the crankcase empty, delivering into an outside reservoir, and another pump to force oil under pressure to the main crankshaft bearings. This lubrication system also followed the German practise in allowing the overflow in the main bearings to travel out the face of the crank cheeks to a scupper, which collected this excess for crank-pin lubrication. This is very economical in the use of oil and is still the standard German practise.

"The present system is similar to the first practise, except that the oil, while under pressure, is not only fed to main bearings, but through holes inside of crank cheeks to crank pins, instead of feeding these crank pins through scuppers. The difference between the two oiling systems consists of carrying oil for the crank pins through a hole inside the crank cheek, instead of up the outside face of the crank cheek.

"Propeller hub—The Hall-Scott propeller hub design was adopted to the power of the Liberty engine.

"Water Pump—The Packard type of water pump was adapted to the Liberty.

"Carburetor—A carburetor was developed by the Zenith company for the Liberty engine.

"Bore and Stroke—The bore and stroke of the Liberty engine is 5x7 inches, the same as the Hall-Scott A-5 and A-7 engines, and as in the Hall-Scott 12-cylinder engine.

Development of the Engine.

"Remarks—The idea of developing Liberty engines of four, six, eight and 12 cylinders with the above characteristics was first thought of about May 25, 1917. The idea was developed in conference with representatives of the British and French missions May 28 to June 1, and was submitted in the form of sketches at a joint meeting of the Aircraft (Production) Board and the joint Army and Navy Technical Board June 4. The first sample was an eight-cylinder model, delivered to the Bureau of Standards July 3, 1917. The eight-cylinder model, however, was never put into production, as advices from France indicated that demands for increased power would make the eight-cylinder model obsolete before it could be produced.

"Work was then concentrated on the 12-cylinder engine, and one of the experimental engines passed the 50 hour test Aug. 25, 1917.

"After the preliminary drawings were made engineers from the leading engine builders were brought to the Bureau of Standards, where they inspected the new

designs and made suggestions, most of which were incorporated in the final design. At the same time expert production men were making suggestions that would facilitate production.

"The Liberty 12-cylinder engine passed the 50 hour test, showing, as the official report of Aug. 25, 1917, records, 'that the fundamental construction is such that very satisfactory service with a long life and high order of efficiency will be given by this power plant, and that the design has passed from the experimental stage into the field of proven engines.'

"An engine committee was organized informally, consisting of engineers and production managers of the Packard, Ford, Cadillac, Lincoln, Marmon and Trego companies. This committee met at frequent intervals, and it is to this group of men that the final development of the Liberty engine is largely due."

Lincoln Highway In Pennsylvania Will Be Repaired

Route Over Which Heavy Government Truck Trains Have Been Passing to Coast Will Be Maintained.

After carrying an unprecedented amount of exceptionally heavy traffic during the past Winter and Spring, due to the movement of government and freight motor truck trains over the route to Atlantic coast ports many sections of the Lincoln Highway in Pennsylvania have been badly cut up. Provision is being made, however, for the maintenance of the road in good condition.

Lieutenant Governor Frank B. McLain, Pennsylvania State Consul of the Lincoln Highway Association, speaking in this connection, states that tremendous demands have been made upon the Lincoln Highway in the course of the past few months, and that to aid in keeping it in good condition the Pennsylvania Commission of Safety and Defense, of which the lieutenant governor is secretary and treasurer, has set apart a sum of \$500,000 to be spent in assisting the Highway Department in the upkeep of trunk line highways during the coming summer. The funds will be expended by the State Highway Department under the supervision of the lieutenant governor. A fairly good part of the road to be maintained with this fund is constituted by the Lincoln Highway.

Work is now being done upon the Lincoln Highway, leading from Pott into the city of Philadelphia, which has shown extreme signs of wear.

The Duty of the Employer in the Reconstruction of the Crippled Soldier

By DOUGLAS C. McMURTRIE,

Director Red Cross Institute for Crippled and Disabled Men, New York City.

We must count on the return from the front of thousands of crippled soldiers. We must plan to give them on their return the best possible chance for the future.

Dependence cannot be placed on monetary compensation in the form of a pension, for in the past the pension system has proved a distinct failure in so far as constructive ends are involved. The pension has never been enough to support in decency the average disabled soldier, but it has been just large enough to act as an incentive to idleness and semi-dependence on relatives or friends.

The only compensation of real value for physical disability is rehabilitation for self-support. Make a man again capable of earning his own living and the chief burden of his handicap drops away. Occupation is, further, the only means for making him happy and contented.

Soon after the outbreak of hostilities the European countries began the establishment of vocational training schools for the rehabilitation of disabled soldiers. They had both the humanitarian aim of restoring crippled men to the greatest possible degree and the economic aim of sparing the community the burden of unproductivity on the part of thousands of its best citizens. The movement had its inception with Mayor Edouard Herriot of the city of Lyons, France, who found it difficult to reconcile the desperate need for labor in the factories and munition works while men who had lost an arm or a leg, but were otherwise strong and well, were idling their time in the public squares. He therefore induced the municipal council to open an industrial school for war cripples, which has proved the example and inspiration for hundreds of similar schools since founded throughout France, Italy, Germany, Great Britain and Canada.

Physical Handicaps Overcome.

The disability of some crippled soldiers is no bar to returning to their former trade, but the injuries of many disqualify them from pursuing again their past occupation. The schools of training prepare these men for some work in which their physical handicap will not materially interfere with their production.

The education of the adult is made up largely of his working experience. The ground work of training in his past occupation must under no circumstances be abandoned. The new trade must be related to the former one or be, perhaps, an extension or specialization of it. For example, a man who had done manual work in the building trades may by instruction in architectural drafting and the interpretation of plans be fitted for a foreman's job, in which the lack of an arm would not prove a serious handicap. A train man who had lost a leg might wisely be prepared as a telegrapher, so that he could go back to railroad work, with the practice of which he is already familiar.

Whatever training is given must be thorough, for an adult cannot be sent out to employment on the same basis as a boy apprentice. He must be adequately prepared for the work he is to undertake.

The one-armed soldier is equipped with working appliances which have supplanted the old familiar artificial limb. The new appliances are designed with a practical aim only in view; they vary according to the trade in which the individual is to engage. For example, the appliance for a machinist would be quite different from that with which a wood turner would be

provided. Some appliances have attached to the stump a chuck in which various tools or hooks can interchangeably be held. The wearer uses these devices only while at work; for evenings and holidays he is provided with a "dress arm," which is made in imitation of the lost natural member.

An important factor in the success of re-educational work is an early start, so that the disabled man shall have no chance to go out unemployed into the community. In even a short period of exposure to the sentimental sympathy of family and friends, his "will to work" is so broken down that it becomes difficult again to restore him to a stand of independence and ambition. For this reason, therefore, the plan for his future is made at as early a date as his physical condition admits, and training is actually under way before the patient is out of the hospital.

Employee's Responsibility.

In the readjustment of the crippled soldier to civilian life, his placement in employment is a matter of the greatest moment. In this field the employer has a very definite responsibility.

But the employer's duty is not entirely obvious. It is, on the contrary, almost diametrically opposite to what one might superficially infer it to be. The duty is not to "take care of" from patriotic motives a given number of disabled men, finding for them any odd jobs which are available, and putting the ex-soldiers in them without much regard to whether they can earn the wages paid or not.

Yet this method is all too common. A local committee of employers will deliberate about as follows: "Here are a dozen crippled soldiers for whom we must find jobs. Jones, you have a large factory; you should be able to take care of six of them. Brown, can you not find places for four of them in your warehouse? And Smith, you ought to place at least a couple in your store."

Such a procedure cannot have other than pernicious results. In the first years of war the spirit of patriotism runs high, but experience has shown that men placed on this basis alone find themselves out of a job after the war has been over several years, or in fact, after it has been in progress for a considerable period of time.

A second weakness in this method is that a man who is patronized by giving him a charity job, comes to expect as a right such semi-gratuitous support. Such a situation breaks down rather than builds up character, and makes the man progressively a weaker rather than a stronger member of the community. We must not do our returned men such injury.

Should Consider Man's Future.

The third difficulty is that such a system does not take into account the man's future. Casual placement means employment either in a make-shift job as watchman or elevator operator, such as we should certainly not offer our disabled man except as a last resort—or in a job beyond the man, one in which, on the cold-blooded considerations of product and wages, he cannot hold his own. Jobs of the first type have for the worker a future of monotony and discouragement. Jobs of the second type are frequently disastrous, for in them a man, instead of becoming steadily more competent and building up confidence in himself, stands still as regards improvement and loses

confidence every day. When he is dropped or goes to some other employment the job will have had for him no permanent benefit.

Twelve men sent to 12 jobs may all be seriously misplaced, while the same 12 placed with thought and wisdom and differently assigned to the same 12 jobs may be ideally located. If normal workers require expert and careful placement, crippled candidates for employment require it even more.

The positive aspect of the employer's duty is to find for the disabled man a constructive job which he can hold on the basis of competency alone. In such a job he can be self-respected, be happy and look forward to a future. This is the definite patriotic duty. It is not so easy of execution as telling a superintendent to take care of four men, but there is infinitely more satisfaction to the employer in the results, and infinitely greater advantage to the employee. And it is entirely practical, even in dealing with seriously disabled men.

A cripple is only debarred by his disability from performing certain operations. In the operations which he can perform the disabled man will be just as efficient as his non-handicapped colleague, or more so. In the multiplicity of modern industrial processes it is entirely possible to find jobs not requiring the operations from which any given type of cripples are debarred. For such jobs as they can fill the cripple should be given preference.

Must Give Cripples a Chance.

Thousands of cripples are now holding important jobs in the industrial world. But they are men of exceptional character and initiative and have in general made their way in spite of employers rather than because of them. Too many employers are ready to give the cripple alms, but not willing to expend the thought necessary to place him in a suitable job. This attitude has helped to make many cripples dependent. With our new responsibilities to the men disabled in fighting for us the point of view must certainly be changed. What some cripples have done other cripples can do—if only given an even chance.

The industrial cripple should be considered as well as the military cripple, for in these days of national demand for the greatest possible output there should not be left idle any men who can be made into productive workers.

With thoughtful placement effort many men can be employed directly on the basis of their past experience. With the disabled soldiers who profit by the training facilities the government will provide, the task should be even easier.

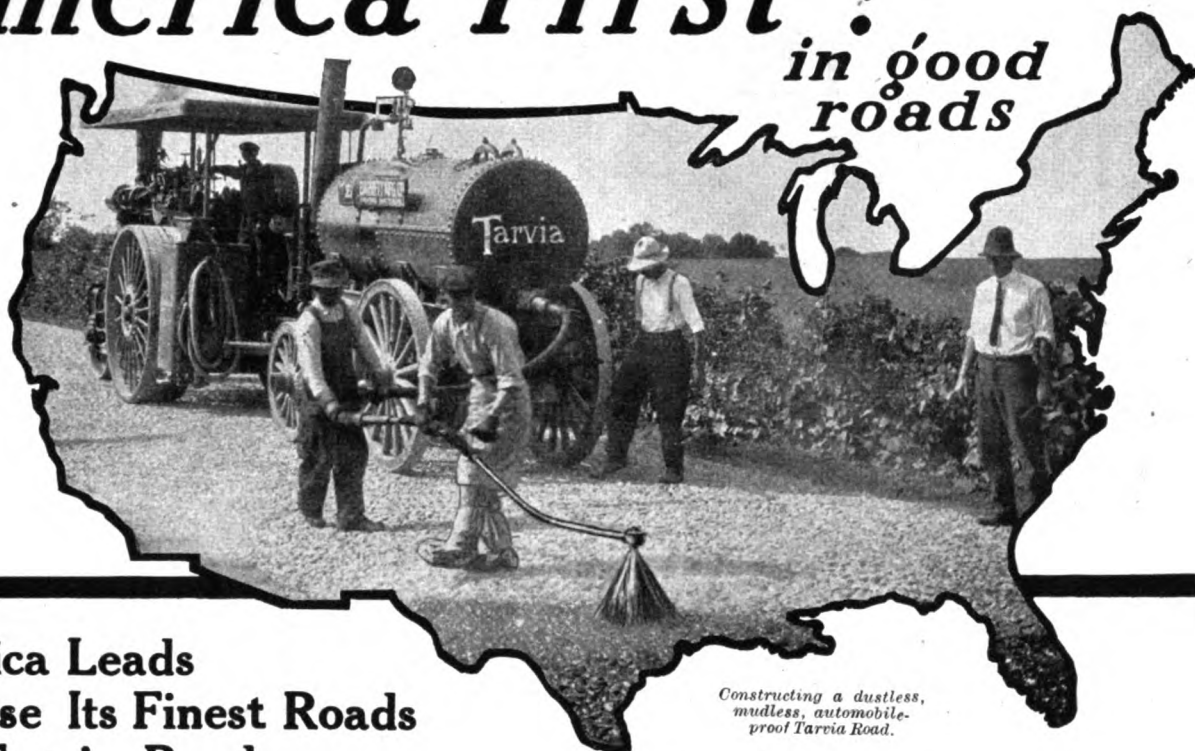
This, then, constitutes the charge of patriotic duty upon the employer:

To study the jobs under his jurisdiction to determine what ones might be satisfactorily held by cripples. To give the cripples preference for these jobs. To consider thoughtfully the applications of disabled men for employment, bearing in mind the importance of utilizing to as great an extent as possible labor which would otherwise be unproductive. To do the returned soldier the honor of offering him real employment, rather than proffering him the ignominy of a charity job.

If the employer will do this it will be a great factor in making the complete elimination of the dependent cripple a real and inspiring possibility.

America First!

in good
roads



Constructing a dustless,
mudless, automobile-
proof Tarvia Road.

America Leads Because Its Finest Roads Are Tarvia Roads—

Twenty-five years ago, the roads of Europe were the best in the world.

Two centuries of incessant care had made them so smooth and firm the people thought they would never wear out. But along came the automobile, destructive alike to the roads and all road-building traditions.

The highways had not been constructed to bear this kind of traffic, and unless protected by modern methods they promptly went to pieces.

So Europe had to start even with America in developing roads that could withstand the gruelling test of the new conditions.

Now America leads.

The finest roads the world has ever seen are now constructed in this country and a very large part of these roads are built and preserved with Tarvia.

Tarvia roads are dustless and mudless, durable and automobile proof. They give the maximum of wear at the minimum of maintenance expense.

Tarvia roads are an asset to any community because they make intercourse easier and increase property values.

They are an asset to the nation because they shorten the market haul and release labor for more productive work. Now when we are at war and the railroads are clogged with traffic good roads are more necessary than ever.

With plenty of good roads, motor-truck traffic can take care of thousands of tons of food, fuel, and munitions and relieve the railroads to a very great extent.

Every highway authority, every government official, should be interested in this problem because good roads will help us win the war.

Tarvia

Preserves Roads-Prevents Dust

New York Chicago
St. Louis Cleveland
Detroit Birmingham
Nashville Salt Lake City

The *Barrett* Company

Philadelphia Boston
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Kansas City Minneapolis
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Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by any one interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will have prompt attention.

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STA-TITE Piston Rings

Play an Important Part in the Success of America's Leading Automobiles, Motor Trucks and Tractors.

Every automobile engineer will tell you that the Life, Power, Speed, Hill Climbing Ability and Operating Cost of a gasoline driven vehicle depends on its motor.

The strength and power of any motor depends largely on its compression. Perfect Compression means an efficient, clean, smooth running motor.

A motor without perfect compression is troubled with improper lubrication, lack of power, and an accumulation of carbon.

STA-TITE RINGS give Perfect Compression and overcome these troubles—besides saving on oil, gasoline and repair bills.

STA-TITE RINGS insure proper lubrication and prevent pistons from wearing dry and scoring cylinder.

STA-TITE RINGS are guaranteed to be leak proof.

Dealers You should sell STA-TITE RINGS. The three piece construction assures equal distribution of pressure on cylinder walls.

Remember—STA-TITE RINGS are manufactured by the largest manufacturers of piston rings in the world.

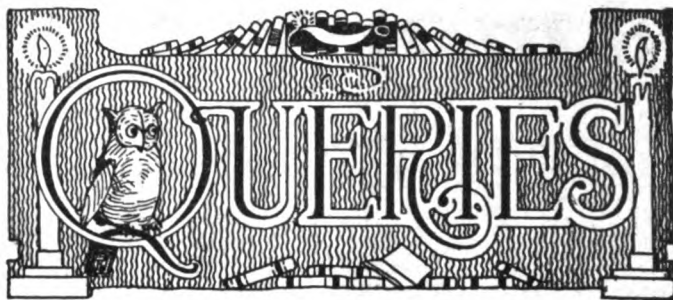
Send NOW—TO-DAY for "TWELVE REASONS" why STA-TITE RINGS will prove to be business builders.



110 Sanford St.

Muskegon, Mich.

Makers Also of "Quality" Snap Rings



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW DO YOU TAKE CARE OF THE BRAKES ON YOUR CAR AND WHAT METHODS DO YOU USE TO KEEP THEM IN CONDITION?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the issue in which the question appears. Answers to the question should be in the hands of the editors by the 5th of July. The contest is open to every one.

HOW HAVE YOU SILENCED SQUEAKS AND RATTLES IN YOUR CAR AND WHAT SPECIAL DEVICES HAVE YOU USED TO ACCOMPLISH THIS END?

(J. Hill, Baltimore, Md.)
Best Letter.

I am a subscriber to the Journal and an appreciative reader of the Queries Column and am pleased to notice in the May 10th issue a request for answers to the question "How Have You Silenced Squeaks and Rattles in Your Car and What Special Devices Have You Used to This End?" This is a good question, for the answer should be of interest to all owners of automobiles who desire to obtain the maximum of efficiency from their machines. Everybody knows that the more rattle and grind a mechanism possesses the more unnecessary wear results and the sooner it will require expensive repair material and labor. At a time when the cost of such commodities is advancing daily it is of interest to every motorist to know how such expense may be avoided and have conservation take the place of waste.

The writer is the owner of a Ford—purchased May 15, 1917—that has been run over 15,000 miles, which is today in better condition than when purchased. The methods by which such a condition was obtained may be easily followed by any owner, either by doing the slight amount of work himself or by being certain that his instructions are carried out by somebody else.

Every noise has a definite and undesirable condition causing it and persistence will ultimately locate it. The reason most Fords rattle is because the cause of the first squeak or rattle was not remedied, thereby making it impossible to immediately notice the subsequent occurrence of other rattles and squeaks when they first developed and before they be-

(When Writing to Advertisers, Please Mention The Automobile Journal.)

came real bad. By prompt attention to the slightest unusual sound the writer is the possessor of a year old Ford that makes less noise when running at a good speed over a cobble stone street or other rough road than half the cars of more expensive make.

Although much of my success was obtained without the use of accessories, nevertheless, I believe that the money spent for what accessories I now have could not have been better invested. As this was my first car and as I had had no previous experience and therefore had slight knowledge of the care of an automobile, by the end of the second week it was a chorus of squeaks and rattles. Many of these were readily remedied by putting lock washers under all nuts and tightening them hard. I then purchased a set of shock absorbers and now feel that they have been worth more than five times their cost, not only because they made the car far more comfortable, but also because they have preserved the car by preventing the car from receiving the sudden wrenches and jars which cause the greatest amount of depreciation. My shock absorbers have prevented the development of rattles and squeaks to an extent greater than I realize until I ride in some car not so equipped.

Another cause for clicks and squeaks, the prevalence of which is way out of proportion to the ease with which it may be remedied is loose rim lugs. Keeping the rim nuts tightened will not only prevent the noise caused by looseness, but will also prevent undue wear of tires by keeping rim in proper place and alignment. Anti-rattles on the steering mechanism will not only stop the rattle, but will give a quicker response in steering. Most owners of Fords who have a muffler with a loose inner shell will find that the purchase of a muffler constructed by the electric welding method will amply repay them with quiet, efficient operation.

Another very annoying source of squeaks is the wood frame of the body. I had great success in silencing such squeaks by painting the wood of the frame and the dash boards with raw linseed oil.

Care should be taken to keep the springs well lubricated. I have found graphite the best lubricant for this purpose. Thin oil if squirted on the side of the springs will run in between the leaves and then monthly applications of graphite will gradually work in and also keep dust and grit out.

The above remarks have an underlying principle that applies to all machines, for the secret of success as I have found it is to get rid of all squeaks and rattles, clicks and other noises by persistent care and prompt correction of their causes, and then keeping free of them by remedying each cause as soon as it appears. A little work at the right time will go a long way, but there are many accessories that may well be purchased that do not cost anywhere near their real value if silence, comfort and depreciation are given due consideration.

HOW HAVE YOU SILENCED SQUEAKS AND RATTLES IN YOUR CAR AND WHAT SPECIAL DEVICES HAVE YOU USED TO ACCOMPLISH THIS END?

(R. L. Prindle, No. Abington, Mass.)

Second Best Letter.

One of the most annoying troubles of an automobile is that constant squeak that cannot be located. It is one of the symptoms of neglect and cries out every time the car aways, or strikes a rough spot, turns a corner, starts or stops. At every move there is a shrill cry of protest which is all the more annoying because it cannot be located. If the squeak comes only when the brake is applied it is evidently in the brake bands, but other squeaks are not so readily discovered.

The next likely place is in the springs and shackle bolts. These are very often neglected and become dry. In order to prevent this the spring leaves should be greased at intervals of about three months with a stiff brush dipped in kerosene, carefully removing all mud and dirt from the springs, shackles, bolts, etc. Prepare a paste made from powdered graphite and a light cup grease mixed thoroughly and when the car weight is removed and spring clips loosened, spread this mixture between each leaf with a special tool designed for this purpose, or a hack saw blade can be used. When the weight of the car is again thrown upon the springs some of this mixture will be squeezed out and can be saved for future use.

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"COMFORT"
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The Comfort Foot Rest

Gives you real comfort by banishing muscle weariness. Insures a constant, even flow of gas and prevents flooding from jamming down the accelerator.

Get a Comfort Foot Rest and add greatly to the pleasure and economy of driving.

From your dealer or direct on receipt of \$2.

THE GENERAL APPLIANCE CO.

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Car Conservation

You can to some extent conserve your car by careful attention to its mechanism. That is as far as you personally can lengthen its life. But the "other fellow" can quickly offset all the care you have ever given it. He can wreck your car in a second of time by a single misinterpretation of signals. Preserve your car, protect your car and your life by telling the "other fellow" definitely what you are going to do. The

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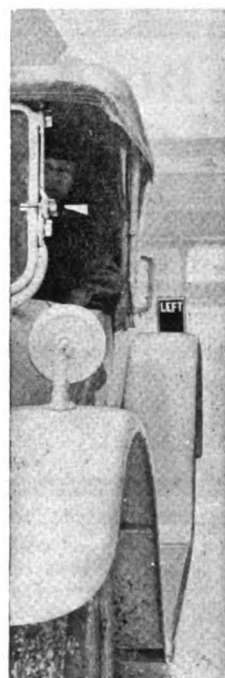
does this. It signals definitely, positively and unmistakably. It prevents the accident. Write at once for further particulars. It may save your life.

SMITH SIGNAL CORPORATION, Mfrs.

WEISS & SINCLAIR, U. S. Distributors

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FRONT VIEW

Note that the Smith Auto Signal relieves traffic as well as signals to front and rear.

POWER

FROM PISTON RINGS



Pat. March 2, '15; Feb. 29, '16

Good oil engineers have found that 80% of the excess oil and unburned gases pass around and behind reciprocating piston rings. The result is lost power and excessive carbon.

Pressure Proof Piston Rings

cannot reciprocate. The spring expander automatically takes up any excess in the ring groove. All possibility of either oil or gases passing between the cylinder walls and the piston is overcome. This is why Pressure Proof Piston Rings permanently eliminate carbon and restore maximum power.

Write for "New Facts About Piston Rings" and special dealer proposition

PRESSURE PROOF PISTON RING CO.
168 Massachusetts Ave. Boston, Mass.

The Accessory and Garage Journal

\$2 the Year, 20 Cents the Single Copy.

The only American publication devoted exclusively to the Power Vehicle and Allied Industries and Trades. A guaranteed circulation of 25,000 copies to trade interests only.

Address all communications to the

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DIXON'S
GRAPHITE
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make a lasting veneer over the wearing surfaces that prevents wear. It's all in the flake graphite found only in DIXON'S. Write for Booklet 210-G.

Made in Jersey City, N. J. by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1837

\$2.00 THE YEAR

The Accessory and Garage Journal

The National Trade Authority

TIMES BUILDING, PAWTUCKET, R. I.

Next, attention should be given the hood and mud guards. Raise each side of the hood and see that the strips of raw hide are in place. If they are worn through or missing they should be replaced. A little neatsfoot oil may be rubbed into them as an extra precaution. Close the hood and see that the metal does not touch at any place. Graphite should be rubbed on the hood hinges and where the rod touches the dash and radiator. Step upon the running boards, take hold of the top and shake the car or drive it along a rough road. If the squeak persists proceed as follows: Fill an oil gun with cylinder oil and place a few drops everywhere that metal meets metal, the bottom of the hood, hood fasteners, at junction of running boards and mudguards, etc. Then crawl under the car and inject oil along the frame where the body touches it. Go over every part repeatedly, forcing oil under pressure into every like place. Of course it's a dirty job and the car will have to be cleaned afterwards, but the squeak is lost and one is amply repaid for his labor.

A general idea of the noise can be obtained by jouncing one end of the car at a time and listening to the part where the noise sounds loudest. This method is not always a sure guide, as one cannot jounce one part of the car without shaking the rest, but it is worth trying as a guide when starting to locate the squeaks. Another help will be to notice whether the squeak occurs when the front wheels strike a bumper or when the rear wheels strike it.

The treatment for a squeaky brake band is to place a very small piece of grease at the opening and let it distribute itself when the wheel revolves. There is danger in putting oil and grease upon the bands, as they are intended to grip and not to slip, so a small amount of grease can do no harm and will stop the noisy squeak.

Great care should be used in attaching guards and fenders when these are removed and by placing a strip of rubber or felt between the part to be replaced and the body of the car. Lock washers should be put under the nuts whenever possible.

Noises and rattle coming from rods underneath, such as wear from radius rods, brakes and truss rods, may be cured by disconnecting each end, and after cleaning insert shims until the proper tightness is obtained. Perhaps new clevis pins are needed and these should be installed at this time. When the job is finished, make sure that such parts as castellated nuts, cotter pins, etc., are in place. Another method used in silencing brake rods consists of fitting coil springs as follows: Midway of the rods secure one end of the spring and if spring is very stiff use a small length of steel wire to finish the distance to the car frame and fasten it. Repeat this with the other rod. Give these springs a coating of graphite to insure their long life.

One reason why cars are noisy is that the muffler brackets become loosened through shocks of the roadway and through vibration. When the brackets become loose a rattle is caused beneath the car, which is often difficult to locate. These should be inspected periodically and if they are kept tight one of the usual sources of noise will be eliminated. Rattles and squeaks coming from beneath the car and springs are generally the result of neglect of lubrication. A rattle alone suggests looseness, which often is the result of natural wear. In every case these should be corrected or serious trouble will come later. A squeak soon becomes a rattle and a rattle soon becomes a wreck.

Comfort to the motorist, as well as those that ride, is had by keeping each and every part lubricated and properly tightened. Car noises from this source will then be kept at a minimum.

(J. W. G., East Boston, Mass.)

I believe I have a very good answer to the "querie question" in the Automobile Journal, which I think will help a good many readers. I have often seen drivers of automobiles hammering away at the door latch and sometimes putting on a new latch. This happens when one has to bang the door very hard, or pull back on the door latch handle to close it. It also often squeaks when closing the door. Put a little oil or grease on the latch and the door will close very easy. This part of the car needs oiling as well as any other sliding or running part. It will save buying a new latch.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

TROUBLE IN LIGHTING CIRCUIT.

(R. B. T., Pittsburgh, Pa.)

I was called upon the other day to repair the lighting system of a Haynes car and being an amateur I ran up against a new system of wiring to me. The starter worked O. K. and the ignition was good, as was the dash and tail lamps. The headlights are giving me the trouble. When I turn on the dimming switch the lights dim, but when I switch over to "Bright" I have only a light in one lamp. I removed the switch and tried all the connections for looseness, but everything seemed tight. The two wires to the lamp are all right or the dimmer wouldn't work. I cannot work for any length of time as it is in use constantly, so am not able to get very deep into the wiring.

Can you send me a wiring diagram or inform me where I can get one of this car?

The electrical system of the Haynes is of the ungrounded or two-wire type. The current is supplied from the storage battery or generator through the automatic circuit breaker to the Delco combination switch. The ignition current comes through the switch to both the ignition coils and completes the circuit through the circuit breaker of the distributor to the negative terminal of the battery or the generator.

All the different lamps are wired in parallel so that if any one lamp burns out it will not affect any other. The wires used in this system are all heavily insulated and they are carried in a loom to further protect them from injury, thus reducing the chances of short circuits.

No doubt your trouble is either in the lamp connection or the lamp itself. The fact that the dimmer lights proves beyond a doubt that the wires to that particular lamp are in good condition. Remove the bulb and socket and go over them in a thorough search. No doubt the trouble is so slight that it will astonish you at its simplicity. I enclose a wiring diagram of the Haynes, which will assist you in locating the source of this annoyance.

Cole Eight, Model 850

(Continued from Page 19.)

Disassembling the Engine.

Remove the radiator retaining nuts. Now remove the water inlet and outlet connections between the radiator and motor. Working the radiator from side to side it may be lifted off readily. Unfasten the distributor casing from the governor housing on the fan shaft assembly. Disconnect the rod running from the radiator to the dash. Remove all wires running to generator and distributor and from spark plugs. Mark them so that they can be placed in their proper order. Remove the bolts holding the generator to the gear case, then remove generator. If the overhaul is to be extensive the exhaust and intake manifolds may be removed. Before disconnecting the manifold or carburetor, the vacuum tank cock should be shut off and the gasoline drained from the carburetor. The control rods to the carburetor may be disconnected at the carburetor end and lifted out of the way.

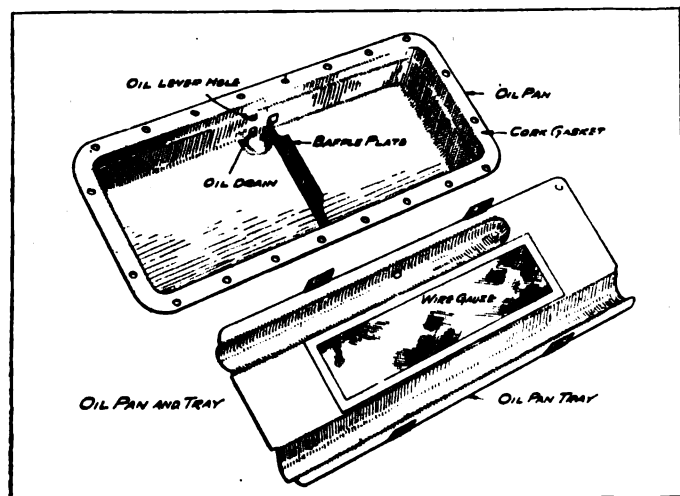


Fig. 5—Oil Pan and Tray.

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TRADE MARK REGISTERED IN
NON-FLUID OIL
UNITED STATES PATENT OFFICE

Steering Towards Better Lubrication

THAT'S what you do when you get NON-FLUID OIL for the gears and bearings of your car.

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has much greater lubricating ability than common greases usually bodied up with a non-lubricating substance that actually increases friction.

Your car will need lubrication less often when you use NON-FLUID OIL as it lasts longer in gears and bearings than cheap grease.

NON-FLUID OIL actually costs you less per month for better lubrication.

Try "K00 special" grade for gears and "K000" for bearings. Ask your dealer for NON-FLUID OIL in the orange colored cans.

New York & New Jersey Lubricant Co.
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Hotel Winton

THE MOTORIST'S LOGICAL STOPPING PLACE

In the center of Cleveland's Activities, Commercial, Industrial and Social.

600 ROOMS—600 BATHS

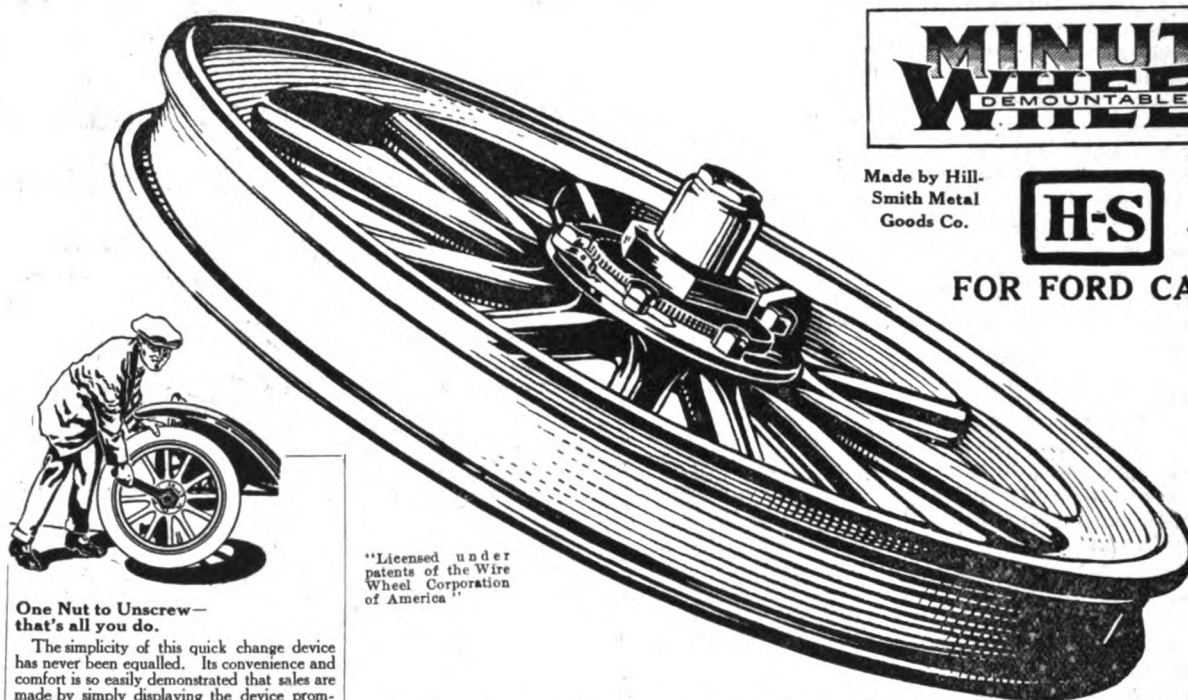
\$2.00 and Up

No trip to Cleveland is complete without a visit to the famous Rainbow Room

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Prospect Avenue at
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CLEVELAND



MINUTE WHEEL DEMOUNTABLE

Made by Hill-
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FOR FORD CARS



One Nut to Unscrew—
that's all you do.

The simplicity of this quick change device has never been equalled. Its convenience and comfort is so easily demonstrated that sales are made by simply displaying the device prominently where Ford owners can see it.

Retail price, \$30.00

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HILL-SMITH METAL GOODS COMPANY
82 Brookline Ave. :: Boston, Mass

Manufacturers of motor parts and
accessory—repair parts for Overland
and Ford cars.

"Licensed under
patents of the Wire
Wheel Corporation
of America"

*The most profitable
accessory of the year.
One sale means a dozen more.*

(For removing valves and grinding and reseating them, repairing valve guides and removing carbon, see General Power Plant Overhaul in May 25th issue Automobile Journal). As has been explained in the description of the construction of the Cole eight-cylinder motor, it is not necessary to remove the motor from the chassis for a general overhaul, as the blocks of cylinders being cast integral with the upper halves of the crank case are readily removable, exposing the crankshaft, bearings and oiling system in lower half of crank case for repair and any replacements that may be necessary.

Adjustment of Front Axle.

Every moving part in this axle is either mounted on a Timken bearing or hardened and ground bushing or pin. To offset any slight wear in the rollers or races the bearings may be adjusted, while the bushings and pins are replaceable at small expense if necessary. The alignment of the wheels is an important factor in the life of the front tires. The distance rod, which is placed at the rear of the front axle for

protection, is provided with adjustments at both ends. This may be lengthened or shortened to bring the front wheels closer together, "toeing in," or farther apart, "toeing out," respectively. At the front the wheels should be about 5/16 inch closer together than the rear, measured at the same height from the ground. This adjustment is checked as follows: Jack up the front of the car from the center of the axle, so that the distance rod is not interfered with. When both wheels are free to revolve, a center line can be marked on each tire by holding a soft pencil against it when spinning. The pencil must be held steady (use a box for a rest) or the result will not be a straight line. Next measure with a tape or stick the distance between these lines at a point level with the hubs, turn the wheels half a revolution and measure again. Then do the same way at the rear. The difference between the two results is the average allowance for a slight wobble and should be 5/16 to 3/8 of an inch less in front than in back.

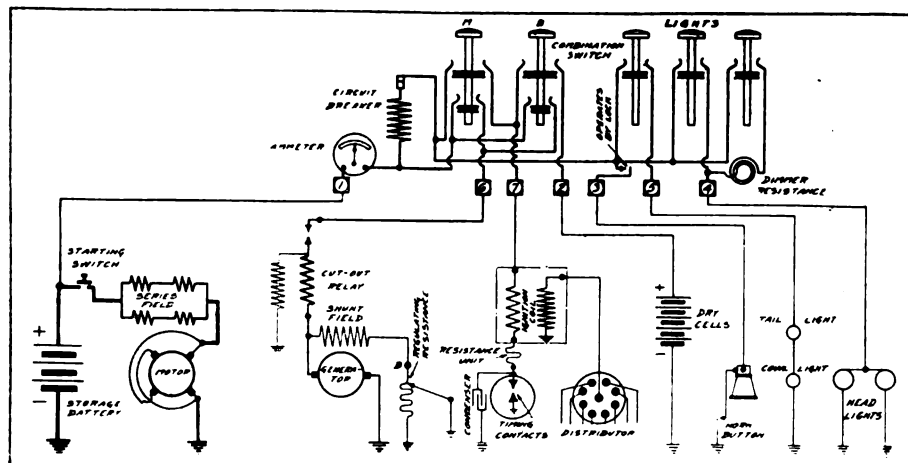


Fig. 6—Wiring Diagram.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Every time a front wheel is removed the bearing cups are removed with it and consequently the bearing must be properly adjusted when the wheel is replaced if it is to give uninterrupted service. The best method is to turn the bearing up tight and then revolve the wheel a few times by hand, which overcomes any tendency for back lash. Then back off the adjusting nut very slightly, so that by grasping two spokes in a perpendicular line, one above and one below the hub, you begin to feel a very slight shake in the wheel. If this is more than barely perceptible, it is too much, and the adjusting nut should be a little tighter, but not enough to cause any binding of the wheel when rotated. When you have it just right, lock it, and the bearings will give the best service.

Cole-Timken Full Floating Rear Axle.

From the standpoint of accessibility, the fixed hub or full floating rear axle used on the Cole has a number of advantages for easy adjustment and repair without removing and tearing down the entire axle. To remove the wheel is only a matter of a few minutes. One nut must first be removed and the wheel puller removes the wheel; another nut releases the bearing adjustment. The spring saddles are solid with the brake supports, so that all the braking effort is transmitted directly through a single casting.

Adjustment of Wheels.

Through usage the wheel bearings or drive shaft bearings (see Fig. 8) are subject to a certain amount of natural wear, which in turn allows end play to develop in the drive shafts. As the wheels are rigidly fastened to drive shafts, by being pulled up on a taper on the shafts, bearing wear will cause side play in wheels, which can be taken up in the following manner, after wheels have been removed: A, in Fig. 8 is the adjusting nut for the bearing B; C, the locking bolt for adjusting nut A. After removing locking bolt C, tighten A by turning clockwise to tighten or counterclockwise to loosen. A special wrench is furnished for this purpose. Care should be taken in making this adjustment not to take up all the play on one side, but it should be equalized. The lining up of the brake drum and the axle housing on the opposite side to that on which the adjustment is being made will indicate whether the wheel is out too far on that side. Take up the adjusting nut so that the drive shafts show no end play, but are perfectly free and the bearings do not bind. Should it be impossible to lock the adjusting nut A when the above results are obtained, back off rather than tighten so that notches will line up in the adjusting nuts. This adjustment does not affect the ring gear or drive gear in any way, due to the fact that the drive shafts float through.

Adjustment of Axle Gears.

Before attempting to make any adjustments, remove the filler goose neck on the left side and front of differential case. See that the back of the teeth on both pinion and rear gear are flush. The helical pinion, which is forged and cut in one piece with the pinion shaft, is mounted with a bearing on either side of the gear, thus holding it rigidly in place. The carrier has been changed so that instead of adjusting from both sides, it is only necessary to adjust the bearings from one side and this takes care of both bearings. The pinion shaft bearing is adjusted from the forward end with a single adjustment. On the pinion shaft and gears take up the play between bearings until there is no end motion, but do not bind or cause the shaft to turn hard. Line up slots in both adjustment nuts, then turn both toward right and bring pinion deeper into mesh with ring gear, or toward left to withdraw. The proper amount of back lash between the teeth of ring gear and pinion is from .006 to .008 of an inch. When making the pinion adjustment examine the grease cup on the pinion housing and add a quantity of grease at the adjustment opening.

If the pinion is flush with the ring gear and there is too much lash in same or too little, the ring gear may be adjusted either in or out to remedy this condition. Make these adjustments: Remove the differential cover plate on rear of axle housing; then take off differential bearing adjustment lock and back off slightly the bolts holding the bearing caps in place, so that adjusting nut can be turned easily. Loosen only a little, as threads in these caps are liable to become cross-threaded if bolts are backed too much. To move gear toward right, back off right hand adjusting nut one or two notches at a time and take up on the left hand nut the same number, or if gear wants to go to the left, reverse the action.

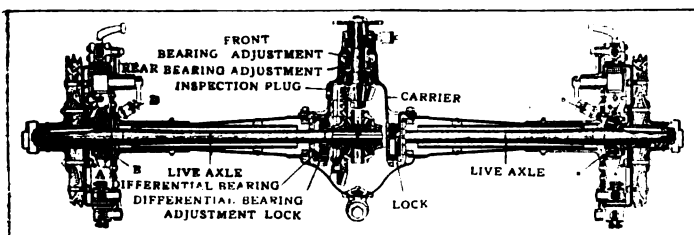
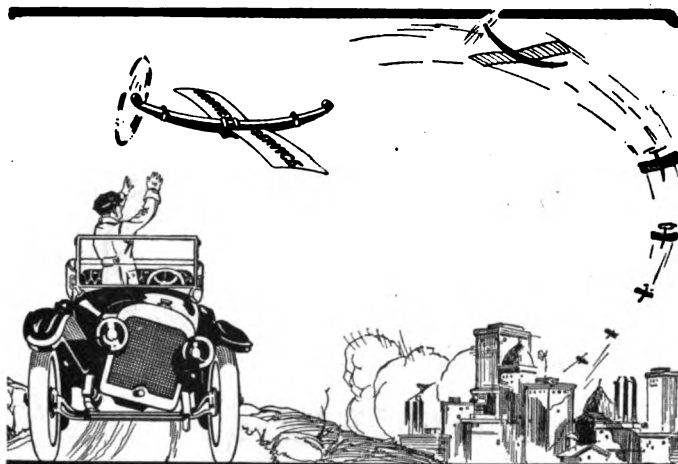


Fig. 8—Cole-Timken Full Floating Rear Axle.

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Harvey to the Rescue

A broken spring—a frenzied customer calling for help—demanding a new spring “rush”! It’s an odd size; you have none in stock to match it!

And yet, you realize the importance of giving this customer real service, not particularly for the profit in this one job alone, nor even for the trade of this one customer, but because service at a time like this will bring the word-o'-mouth publicity which follows naturally when a customer is pleased.

So you call

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Take side play out of the bearings by turning these adjusting nuts. When the proper results have been obtained tighten bearing caps and see that bearing adjusting nut locks are put into place.

Adjusting the Brakes.

The internal or emergency brakes are of the expanding type and work against the inside of the brake drum. In adjusting these brakes first see that the screw is either turned up or loosened so as to have about 1/64 of an inch clearance between the brake drum and brake at this point. After determining this, disconnect the brake rod from the cam lever; then, with the wheel in place, the hand lever released and the wheel jacked up from the floor, move the cam lever forward until brake starts to take hold, release the lever slightly so that there is no drag and connect the rod, making the necessary adjustment to the clevis on this rod so that the above result will be obtained. Make this adjustment to both rear wheels, and care should be taken to get both brakes to take hold at the same time, this being determined by applying brake hand lever a notch at a time. As these brakes are not supplied with equalizers, any variation can be adjusted by either taking up or letting out on the clevises at the ends of the rods.

The external or foot brakes are of the contracting type and work on the outer surfaces of the brake drums. In adjusting these brakes disconnect the brake rod from lever to fall back on the bracket. Starting with the small screw at the rear anchor bracket, space the brake band from drum, allowing 1/64 of an inch clearance all around, which may be obtained by also manipulating the screws on the opposite side.

Adjusting the Steering Gear.

The steering gear is the semi-reversible worm and wheel type. The up and down play in the worm is adjusted by removing four screws and the necessary amount of shim. Care should be taken in not removing too many shims, which would bind the worm. Side play in worm wheel shaft is permanently set in manufacture and does not require readjustment. Keep the bolt on ball arm tight.

Adjusting Stromberg Carburetor.

The mixture at low speed is governed by the needle valve. If too rich, as indicated by the motor rolling or loading, turn the needle valve up or anti-clockwise, thus admitting less gasoline and making the mixture leaner. If the mixture is too lean it should be turned down or clockwise, thus admitting more gasoline and making the mixture richer. In adjusting for low speed or idling, the spark should be retarded and the throttle set at the closed point. If motor cannot be idled by means of the low-speed needle valve the throttle valve requires resetting. It may be closed too tight or not open enough.

For high speed adjusting, advance spark and open throttle. If the mixture is too lean on high speed, turn the auxiliary gasoline needle up or anti-clockwise until desired results are obtained. If mixture is too rich, turn it down or clockwise. At all times there should be at least 1/32 of an inch clearance between the top of the auxiliary gasoline needle and the adjustment nut when the column control is all the way down.

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The driving connection between the transmission and rear axle consists of a set of two Spicer universal joints with connecting shaft. The forward universal joint includes a slip joint that allows for any variation in the over-all length of the set due to spring action. The entire set of universal joints may be removed without disturbing any other parts. The joints should be supplied with a good quality of soft grease, which should be just hard enough so that it will not flow at ordinary temperatures.

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VOL. LXV.

PAWTUCKET, R. I., JUNE 25, 1918.

NO. 10.



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AUTOMOBILE JOURNAL

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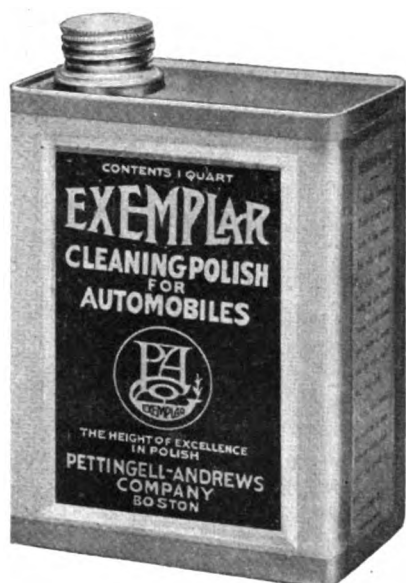
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Meridian.
Pascagoula.
Vicksburg.
West Point.

MISSOURI.
Hannibal.
Kansas City.
Jefferson City.
St. Charles.
St. Louis 2.
Sikeston.

MONTANA.
Billings.
Butte.
Glacier.
Great Falls.
Havre.
Helena.
Lewistown.
Miles City.
Missoula.

NEBRASKA.
Hastings.
Lincoln.
North Platte.
Omaha.

NEVADA.
Gardnerville.
Reno.

NEW HAMPSHIRE.
Berlin.
Dover.
Franklin.
Manchester.

NEW JERSEY.
Atlantic City.
Camden.
Gloucester City.
Jersey City.
Newark.
Orange.
Paterson.
Trenton.

NEW MEXICO.
Albuquerque.
Deming.
Roswell.
Santa Fe.

NEW YORK.
Buffalo.
N. Y. City 16.
Rochester.
Syracuse.

N. CAROLINA.
Charlotte.
Elizabeth City.
Kinston.
Monroe.
Newbern.
Raleigh.
Wilmington.

N. DAKOTA.
Bismarck.
Fargo.

OHIO.
Akron.
Athena.
Canton.
Chillicothe.
Cincinnati.
Cleveland.
Columbus.
Dayton.
Hamilton.
Lima.
Mansfield.
Marietta.
Marion.
Portsmouth.
Sandusky.
Springfield.
Steubenville.
Tiffin.
Toledo.
Washington.
C. House.
Youngstown.
Zanesville.

OKLAHOMA.
Ardmore.
Enid.
Hobart.
Lawton.
McAlester.
Muskogee.
Oklahoma City.
Tulsa.

OREGON.
Astoria.
Eugene.
Medford.
Pendleton.
Portland.

PENNSYLVANIA.
Allentown.
Altoona.
Chester.
Erie.
Harrisburg.
Johnstown.
New Castle.
New Kensington.
Oil City.
Philadelphia 6.
Pittsburgh 2.
Reading.
Scranton.
Williamsport.
York.

RHODE ISLAND.
Providence.

S. CAROLINA.
Charleston.
Columbia.
Marion.
Sumter.

S. DAKOTA.
Huron.

TENNESSEE.
Chattanooga.
Clarksburg.
Columbia.
Copper Hill.
Jackson.
Knoxville.
Memphis.
Nashville.

TEXAS.
Amarillo.
Austin.
Beaumont.
Brownsville.
Dallas.
El Paso.
Fort Worth.
Galveston.
Houston.
Laredo.
Paris.
San Antonio.
Smithville.
Waco.

UTAH.
Cogan.
Ogden.
Salt Lake City.

VERMONT.
Bellows Falls.
Burlington.
Montpelier.
Rutland.

VIRGINIA.
Alexandria.
Danville.
Lynchburg.
Newport News.
Norfolk.
Richmond.
Roanoke.

WASHINGTON.
Aberdeen.
Bellingham.
Everett.
North Yakima.
Seattle.
Spokane.
Tacoma.
Walla Walla.
Wenatchee.

W. VIRGINIA.
Charleston.
Johnstown.

WISCONSIN.
Green Bay.
La Crosse.
Madison.
Milwaukee.
Oshkosh.
Superior.

WYOMING.
Cheyenne.



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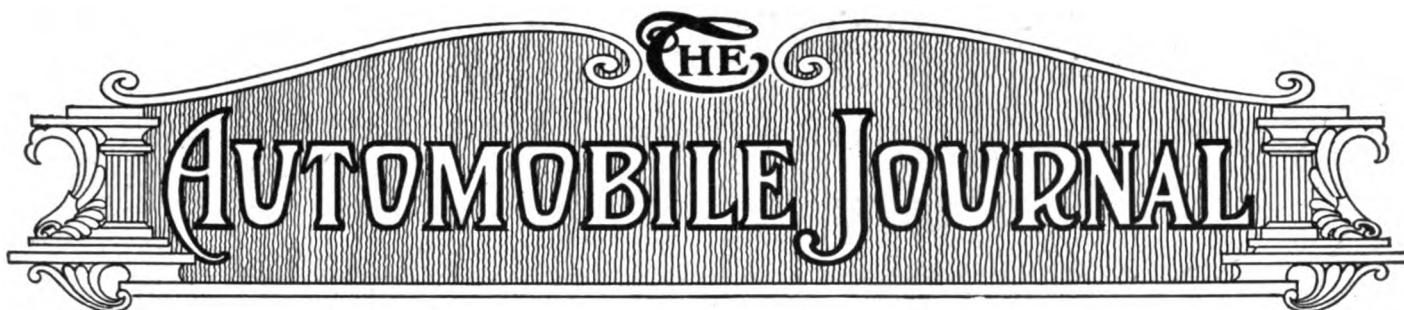
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VOL. LXV.

PAWTUCKET, R. I., JUNE 25, 1918.

NO. 10.

Gasoline and Rubber Supplies Sufficient for Present Needs

Fuel Administration Advises Rational Conservation and Tire Manufacturers
Urge Against Overbuying To Keep Situation Normal and To
Permit Unrestricted Use of Cars

DEVELOPMENTS of the past month are very reassuring from the motorist's viewpoint, as they reveal a situation that is exceedingly gratifying in so far as it affects the operation of motor cars. The facts have been brought out that there will be no such extensive reduction in passenger car production as at first feared, and other reports indicate that the needs of gasoline and tires can be met if the public are reasonable in the consumption of these essentials to motoring.

This favorable but sudden change in the aspect of conditions affecting motoring should be taken as a warning against being unduly disturbed by wild reports and rumors such as were in circulation several weeks ago and which resulted in the creation of a false sentiment in the trade and among the public.

In addition to the reports given below on the gasoline and tire situation there are other reports of recent date indicating a like tendency toward an improved situation motorwise and although of minor importance are indicative of the trend of sentiment at Washington. Provost Marshall Crowder has ruled that chauffeurs of all classes, except those who actually engage in domestic work, will be exempt from the "work or fight" classifications.

The United States Fuel Administration, through Mark L. Requa, director of the oil division, has issued the following statement in regard to gasoline:

"Up to the present time there has been sufficient supply of gasoline to meet all requirements; but in order to be prepared for any shortage, should it arise, plans are being considered by the oil division of the Fuel Administration, in cooperation with the automobile industry and the National Petroleum War Service Committee, for the purpose of determining the most satisfactory method of gasoline conservation.

"It is not expected in any event that it will be necessary to restrict normal

consumption for freight vehicles, and provided there is a reasonable conservation by all concerned it may not be necessary to seriously interfere with pleasure cars and motor boats.

"It must be borne in mind, however, that the paramount use for gasoline is for war purposes, all of which requirements will be supplied. The volume of this will largely govern the situation.

"It seems possible that rational conservation by the public will render government action unnecessary."

The National Automobile Chamber of Commerce is cooperating with Mr. Requa and W. Champlin Robinson, director of oil conservation, to help in this conservation movement. While there is need for saving there is no suggestion of any necessity for curtailing the use of passenger cars on Sunday or any other day, nor the issuance of gasoline cards to limit the amount to be sold to each individual owner. War interests will come first, but as Mr. Requa indicates, with rational conservation by the public, there should be ample for general needs.

The production of gasoline in 1917 was 65,000,000 barrels of 42 gallons each. The first quarter of this year the production was 17,384,000 barrels, as against 13,700,000 barrels for the same period of 1917. On April 1 there were 12,500,000 barrels of gasoline in storage.

With the present uncertainty in the markets where the raw materials are purchased for the various branches of the motor car industry, it is but natural that many unfounded reports and rumors have gained circulation, with the result that the distributors and consumers of these products are more or less disturbed. To set at rest this anxiety in the trade and on the part of the public regarding the true situation, one of the officials of the United States Tire Co. has issued a statement on the situation, in which he sums up conditions as follows:

"As there have been many rumors recently, of varying nature, regarding the

effect of the production and supply of tires, due to the government regulation of crude rubber importation, and policies adopted by some people in the trade, which do not seem to reflect the true situation, we will give herein some facts, as we see them, which we believe will be acceptable to dealers and motorists:

"In order to conserve boat tonnage for military requirements, the government has restricted the importation of crude rubber, the present order in effect to cover a period of three months, at which time further consideration of the matter will be given covering another period.

"The rubber on hand in this country now, together with that en route, is sufficient to take care of normal requirements, covering the first period of restriction, and if the trade and public will refuse to become 'panicky,' due to all sorts of rumors, and refrain from overbuying and hoarding, it is the best belief of this company that unless some unforeseen circumstances arise, it will be entirely possible for the tire production of this country to take care of all needs of the present year.

"Adequate stocks to take care of all requirements should be carried by dealers, but there is no reason existing at this time for loading up beyond normal requirements, either because of an immediate possible shortage, or for any reason that we can now foresee.

"This is a time when the capacity of the tire manufacturer should be used to make sizes and styles which are going to be required by dealers within a reasonable period of time, and customers should place orders for their requirements well in advance in order that we may shape our production to what will actually be required, instead of using our materials, labor and capacity to a certain extent in making sizes and styles which would necessarily have to be carried on hand for an unreasonable period of time."

Headlight Tests Under New York Law Will Be Exacting

Secretary of State Will Establish Testing Laboratory Which Will Certify As To Whether A Device Is Legal and As To Conditions Necessary for Its Operation
Reflector and Candlepower Requirements

Naturally great interest is being shown in the approaching tests of head lamps and lighting devices held under the auspices of the office of secretary of state of New York to determine which types meet the legal requirements of that state under the provisions of chapter 540 of the Laws of New York of 1918.

At the present time tests are being made of some 40 or more lights and lighting devices and as soon as these are completed the secretary will issue a list of those which have been approved. In October another test will be held.

A hearing has been called for Tuesday, June 25, at the office of Secretary of State Hugo and all concerns who have submitted headlights and headlighting devices to be tested have been asked to have a representative present to discuss the proposed uniform specifications in relation to headlights.

The conditions to be fulfilled to comply with the intent of the new law are specified as follows for the purpose of testing:

1. Any pair of head lamps under the conditions of use must cast a beam which when measured on a level surface at a distance of 200 feet directly in front of the car and at some point between the level surface and a point 42 inches above this surface, is not less than 1200 apparent candlepower.

2. Any pair of head lamps under the conditions of use shall cast a beam which, when measured at a distance of 100 feet directly in front of the car, and at a height of 60 inches above the level surface, does not exceed 2400 apparent candlepower, nor shall this value be exceeded at a greater height than 60 inches.

3. Any pair of head lamps under the conditions of use shall cast a beam which, when measured at a distance of 100 feet ahead of the car, and seven feet or more to the left of the axis of the same, and at a height 60 inches or more above the level surface, does not exceed 800 apparent candlepower.

Laboratory Test Required.

In order to determine whether any particular device conforms to these requirements, it shall be subjected to laboratory tests according to the following specifications:

Two pairs of samples of the device submitted shall be subjected to test. In the case of front glasses the samples shall be of $9\frac{1}{4}$ -inch diameter.

Reflector Requirements.

The reflectors used in connection with the laboratory tests shall be of standard high grade manufacture of 1.25-inch focal length, with clean and highly polished surfaces, and as nearly truly paraboloidal in form as practicable, and as approved for this purpose by the national bureau of standards.

The manufacturer of the device shall be given due notice of the date and place of test. Manufacturers' representatives present at the test shall be privileged to adjust their devices in any way which represents an ordinary and legitimate adjustment, including tilting the lamps or reflectors, which can be carried out by purchasers of the device, or such adjustment may be made by the laboratory expert acting on the instructions of the manufacturer. The character of the adjustment so made shall be carefully noted and stated in the report as manufacturer's adjustment.

How Tests Are Made.

The tests shall be as follows:

Test 1. Four-point test of pairs of samples.

A pair of testing reflectors, mounted similarly to the head lamps on a car, shall be set up in a dark room at a distance of not less than 60 feet nor more than 100 feet from a vertical white screen. If a testing distance of 100 feet is taken the reflectors shall be set 28 inches apart from center to center and if a shorter testing distance is taken the distance between reflectors shall be proportionately reduced. The axes of the lamps shall be parallel and horizontal, or as tilted in accordance with manufacturer's adjustment. The intensity of the combined beams shall then be measured with each pair of samples in turn, with the reflectors fitted with a pair of each of the following types of incandescent lamps, in turn:

- (1) Vacuum type, 6-8 volts, 17 mscp., G-12 bulb.

- (2) Gas filled type, 6-8 volts, 20 mscp., G-12 bulb.

The lamps shall be adjusted to give their rated candlepower. Measurements shall be made at the following points at the surface of the screen:

- A. In the median vertical plane parallel to the lamp axes, on a level with the lamps.

- B. In the same plane one degree of arc below the level of the lamps.

- C. In the same plane one degree of

arc above the level of the lamps.

- D. Four degrees of arc to the left of this plane and one degree of arc above the level.

Specifications of Samples.

In an acceptable device both pairs of samples shall conform to the following specifications for observed apparent candlepower:

- Points A and B. At at least one of these points the apparent candlepower shall not be less than 1200.

- Point C. The apparent candlepower shall not exceed 2400.

- Point D. The apparent candlepower shall not exceed 800.

Provided, however, that if the test indicates that a device which is unacceptable with either of the test lamps will come within the specifications with lamps of another candlepower or of the other type, the device may be passed with corresponding limitations as to the incandescent lamps to be used in connection with it.

Test 2. Complete test of single sample.

A single sample taken as an average representative of the device as manufactured, shall be submitted to a complete test with a vacuum incandescent lamp of 17 candlepower 6-8 volt rating in a G-12 bulb. This test shall show its beam characteristics by actual measurements made according to recognized and exact methods.

One pair of the samples submitted shall be retained by the testing laboratory for purpose of future reference and as samples of construction, and the other pair shall be returned to the office of the secretary of state.

Report on Result of Test.

The report of the tests shall be rendered in duplicate to the secretary of state, and shall be signed or initialed not only by the expert making the test, but also by a person representing the more general responsibility of the institution making the test. It shall include a statement by the testing laboratory as to whether the device has passed or has not passed the specifications as herein given; also, a statement as to the maximum or minimum candlepower to be used with the same and as to the other conditions necessary in the operation of the device in such a way that it will comply with the requirements of this specification.

General Chassis Overhaul

Practical Methods of Overhauling Chassis Units and Parts—Adjustments of Differential Gears and Brakes

IN THE general overhauling of the chassis are included the front and rear axles, the several different types of steering gears used on the 15 cars designated in the accompanying table, and also included are the repairs and adjustments of brakes and universal joints.

The Semi-Floating Rear Axle.

This type of axle is used on the Ford, Reo, Chalmers, Saxon Six and Hudson Super Six. This axle is sometimes termed the fixed hub type. The driving shafts turn freely within the housing. At their outer ends they are fixed in the hubs of the wheels and carry the bending stresses, as well as the torque. The hub of the wheel is fitted to the shaft with Woodworth keys and a nut, which serve to secure the wheel to the shaft. The hub cap is merely a protection to the end of the hub.

Chalmers-Timken Rear Axle as Example.

(Disassembling and adjustments on the Hudson-Timken rear axle are practically the same as on the Chalmers.)

If it is necessary to give the rear axle a thorough overhauling, remove it from the chassis. Block up rear end of car so all weight is taken from the axle, and then remove the wheels. Remove hub cap lock and hub cap with regular wrench furnished with the car equipment. Then remove the cotter pin and nut on drive shaft and pull wheel off the end of drive shaft with wheel puller. Replace nuts on end of drive shafts to protect threads. The wheel is taper fit on shaft. Do not have brakes set when pulling wheel. When replacing wheel be sure it does not ride the key in drive shaft and that wheel tightens up very tight on taper. In taking off the wheel hub remove eight bolts holding hub to spokes and drum. Bolts are riveted after nuts are tightened in place. Use file or chisel to remove riveting so nuts can be removed. In replacing always use new bolts. Wheel should be evenly supported on spokes as close to the hub as possible when hub is being pressed or driven out of position. This is to insure no strain coming on the spokes at felly. Remove six bolts holding drum to wheel spokes, when drum can be removed.

Next remove rear axle drive shafts by removing lock and

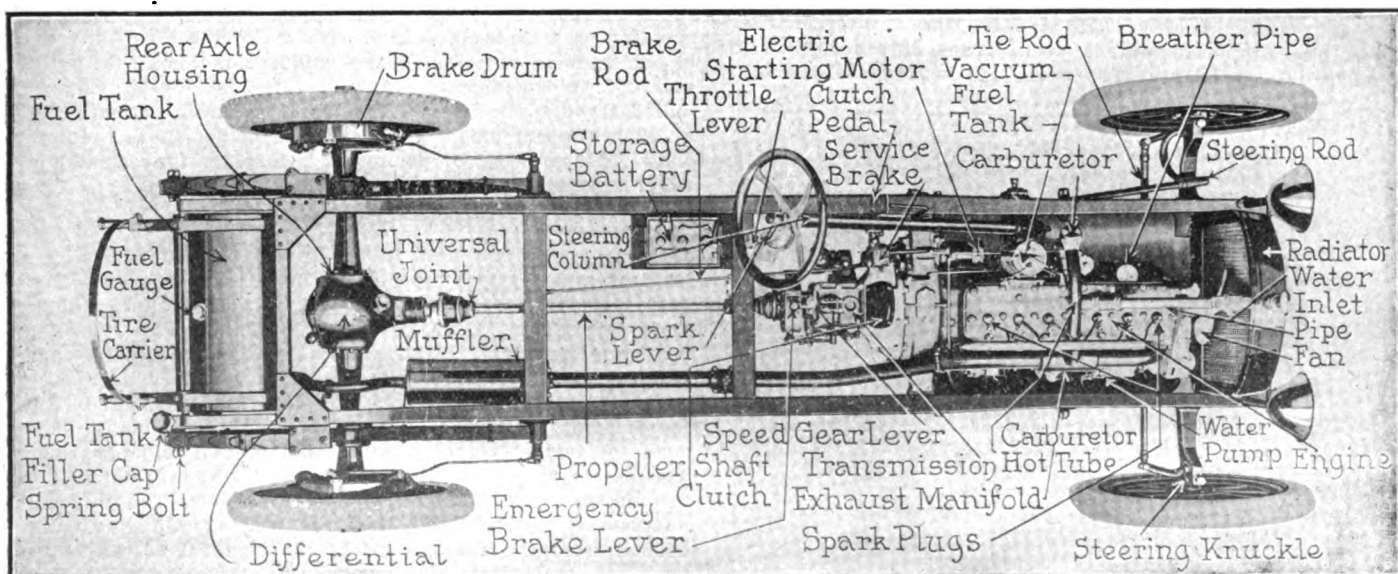
TYPES OF PARTS AND UNITS OF 15 CARS, AS PARTICULARLY RELATED TO THE GENERAL CHASSIS OVERHAUL.

Make	Type of Steering Gear	R. Axle	Type of Gears	Make of Rear Axle
Ford	Sun and planet	½ Float.	Bevel	Own
Chevrolet 490.....	Worm and wheel	¾ Float.	Bevel	Own
Overland 79.....	Worm and	¾ Float.	Bevel	Own
Maxwell	Worm and worm	¾ Float.	Bevel	Own
Studebaker 4s and 6s.....	Worm and wheel	Float.	Bevel	Own
Dodge	Worm and worm	Float.	S. & B.	Own
Cadillac	Worm and sector	Float.	S. & B.	Timken
Reo	Bevel pinion and sector	½ Float.	S. & B.	Own
Oldsmobile Eight.....	Worm and nut	Float.	S. & B.	Mott
Chalmers 6-30.....	Worm and worm	½ Float.	S. & B.	Timken
Saxon Six.....	Worm and worm	½ Float.	S. & B.	Timken
Buick "Little Six".....	Worm and nut	Float.	S. & B.	Mott
Paige	Screw and nut	¾ Float.	S. & B.	Salisbury
Hudson Super Six.....	Worm and wheel	½ Float.	S. & B.	Timken
Hupmobile	Worm and nut	¾ Float.	S. & B.	Own

Abbreviations—Axle, ½ float., semi-floating; ¾ float., three-quarter floating; float., floating.

lock bolt clamping bearing adjusting nut. Remove nut, pull on shaft and it and bearing will come endwise out of axle housing. Remove bearing from shaft by pressing off over wheel end of shaft. Two axle shafts butt together in differential, and adjustment of bearing should bring shaft ends together and not allow end play. Adjust bearing by means of large nut containing bearing cup, so very slight motion can be felt by working up and down on shaft. In replacing axle shafts be sure to adjust both shafts even so rear wheels will not be pulled out of correct position under car. Bearing cup can be changed by pressing or tapping out of nut and pressing in new bearing cup. Be sure to get cup seated square and firm in nut. In absence of press, use block of hard wood to drive cup in place. Inside of bearing adjusting nut is circular felt packing ring to prevent oil from leaking into brake drum, which should fit axle drive shaft snug.

To remove rear axle from the car: Disconnect rear universal joint. Disconnect four brake pull rods by removing clevis pins. Remove spring bolts from each spring and lower axle to floor, slide from under car. Remove eight nuts and spring clips, then remove springs from axle. When reassembling springs and axle under car, be sure all spring bolts are



Typical Motor Car Chassis, with All the Principal Units and Parts Designated.

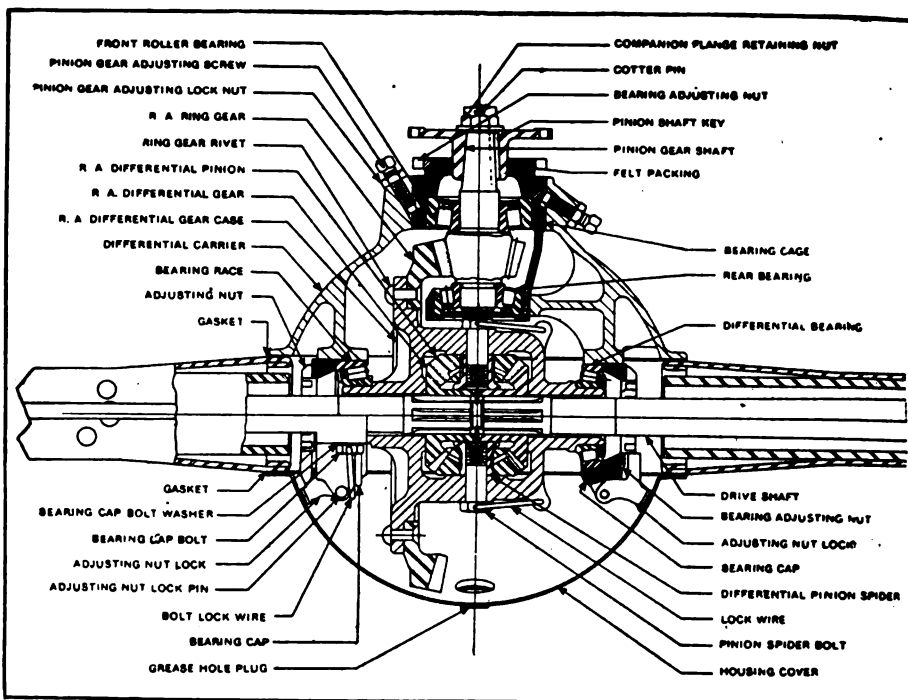
correctly adjusted and spring clips are tight.

To remove differential carrier from rear axle remove 10 cap screws clamping differential carrier to axle housing, and remove carrier by pulling it forward out of axle housing. To remove differential from carrier, remove lock wires and differential bearing cap bolts and caps; remove bearing adjusting nuts and ring differential assembly. Ring gear is riveted to differential gear case, and no attempt should be made to remove gear from case unless absolutely necessary. In case new gear is to be installed, rivets should be heated and riveted in place while hot.

To remove differential gears from gear case: Remove four lock wires and eight $\frac{3}{8}$ inch cap screws from side of differential case. Gears and spider can then be taken out. Differential pinion gears are drilled with three holes between teeth to lubricate bearings. They get lubrication from hole in center of spider. In replacing gears or installing new gears, approximately .010 inch end float should be allowed in gears; this gives gears correct clearance.

To remove rear axle drive pinion assembly from carrier: (Cannot be removed with ring gear in carrier.) Remove pinion bearing adjusting nut lock and bolts; remove universal joint; remove large nut on end of pinion shaft and pull universal yoke off pinion shaft. Back out bearing adjusting nut on front of pinion shaft and remove pinion assembly by pressing or tapping out of position in carrier. Rear Timken bearing is pressed fit on pinion shaft, and front bearing a light tapping fit on pinion shaft. The bearing races are pressed in housing.

To adjust gears: When adjusting pinion to ring gear, back of gear teeth should be as even as possible. From .004 to .008 inch clearance in teeth will usually run quiet. Backs of gear teeth can be seen by removing pipe plug on top of differential carrier and looking through this opening. Do not try to adjust pinion by moving large castle nut just in rear of universal joint. Pinion is adjusted back and forward by means of two adjusting nuts in the carrier, which are male and female. Adjustments can be made through space provided in carrier housing. Ring gear is adjusted right or left by means of two gearing adjusting nuts. Be sure that all adjustments are locked, bolts tight and wires in position. Do not get Timken bearings adjusted too tight. Plug in rear cover plate is permanent oil level. When only necessary to remove differential assembly same can be removed through



Semi-Floating Timken Rear Axle Used on the Chalmers 6-30 and Hudson Super Six.

rear axle housing.

Saxon Six Semi-Floating Rear Axle.

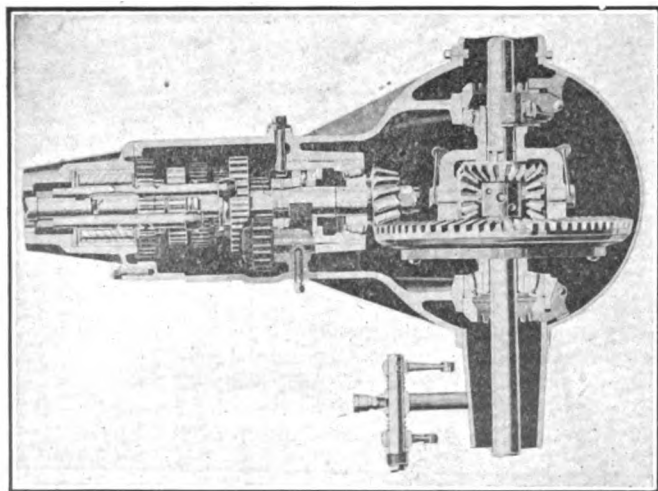
After the rear universal joint has been removed the four screws that hold the transmission cover in place should be removed. The front roller bearing is clamped into place by a bolt which passes through the flange. When the bolt is removed the race may be drawn from the case for examination. After the transmission gearset covers have been removed, both the main shaft with all gears and the counter shaft may be removed. The rear bearing race is held in place by a set screw and when the screw is removed the race may be driven from the case.

The rear axle is the semi-floating type, and it is unnecessary to disassemble the housing to examine the bearing and gears. Remove the differential cover plate and the nuts on the wheel flanges and when this is done the shafts may be removed from the axle. After the shafts are removed inside of the wheels will be found a large nut, which is kept from turning by means of a washer having a bent over lug. Straighten this lug and turn off the large nut. The wheels may then be pulled off and the roller bearings examined. The differential is mounted upon two roller bearings, the outer races of which are in two-clamp supports. The two supports are integral with studs, which extend through the front part of the housing and fasten the transmission gearset to the axle. With the supports removed the differential may be pulled through the hole at the rear. A careful examination of all gears and mountings should be made. If the pinions show signs of wear or do not fit the spider they should be renewed or a new spider substituted.

The Reo Semi-Floating Rear Axle.

Both wheels are held in the conventional manner by a lock nut and key to a taper shaft, and after the wheels have been removed the assembly should be placed on two boxes or horses. The pinion drive gear, together with its roller bearings, is mounted in an adjustable housing, called a cage, and is clamped into place by a locking bolt. The locking bolt should first be removed and the cage unscrewed from the housing. With the cage will be carried the pinion drive gear, the rear universal member and the two roller bearings. The pinion gear and shaft are integral and are fastened to the universal member by a taper pin and key. The universal member is first removed, then the bearing adjusting collar backed from the shaft, allowing the removal of the pinion gear and shaft from the rear. Both bearings may then be taken out.

Before this assembly is put back into place the pinion



Saxon Rear Axle and Transmission Assembly.

gear should be properly adjusted in the cage. First replace the universal joint member on the pinion gear shaft, then turn the bearing adjusting collar down until nearly all of the end play is taken up. Never adjust roller bearings so tight that there is no play, for, although the members will rotate smoothly, the wear will be great. When the pinion gear has been adjusted in the cage the cage may be replaced.

Both halves of the shaft housing are bolted into the central or differential casing and should next be removed. The differential assembly, together with the shafts, may be lifted from the casing after the cover plate has been removed.

The differential bearings may be removed, exposing the differential adjusting nuts, mounted on the differential housing. To facilitate adjustment these nuts should be left in place. Eight cap screws hold the differential housing together and when these are removed the differential may be disassembled. Both differential gears are pinned and keyed to the axles. In reassembling the rear axle the differential, together with all bearings and shafts, should first be placed in the casing, the two shaft housings put into place, then the pinion gear cage and assembly replaced.

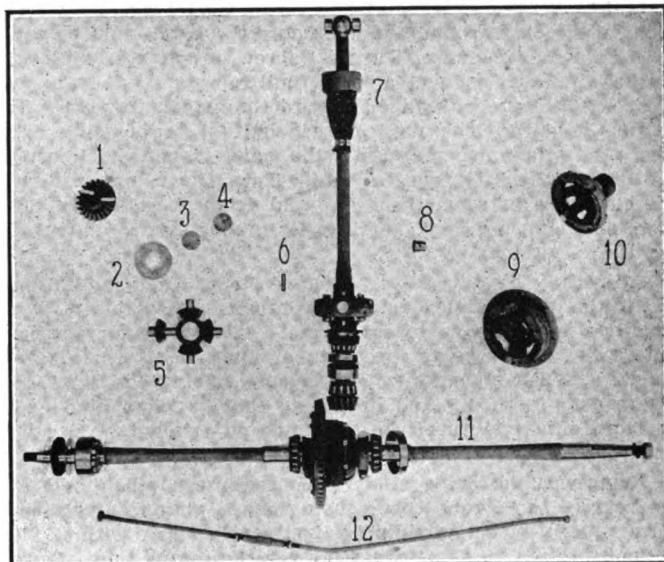
The pinion gear should then be adjusted so that the back of the gear is on a line with the edge of the master or driven gear, then the master gear brought by the adjusting nuts against the pinion gear until the backs of the teeth are on a line and the teeth fully meshed or "bottomed." The master gear is then adjusted so that a slight clearance is had, and the pinion gear turned by a hand crank. As the pinion gear is turned the master gear should run smoothly with neither grind or rattle and if the gears are not worn badly, this may be had by proper adjustment, always bearing in mind that the backs of the teeth of the two gears should be in line.

The Full-Floating Rear Axle.

This design of axle is used on the Cadillac, Oldsmobile, Buick, Dodge and Studebaker. The full-floating design permits the live shafts to revolve freely inside of the housing without actually touching the latter. The shafts are supported on their inside end by the differential assembly, and on their end are carried by the wheel itself, being attached to the wheel by a large steel flange through which the shafts drive the wheels. The shafts literally "float," as they do not come into contact with any bearing and are not used to help support the car, but simply cause the rear wheels to revolve.

The Mott Full-Floating Rear Axle Used on Buick and Oldsmobile.

Trouble in this rear axle may be detected by a grinding noise, usually caused by looseness between the driving gears or by worn teeth, and in such cases readjustment is necessary. If there is a peculiar click when letting in the clutch or when changing gears, this is due to slack in the driving system, and the proper adjustment should be made. If there is an intermittent catch, or one occurring in every revolution of the wheel, the cause may be a broken tooth or a part of a broken tooth catching. In such a case the axle should be torn down and overhauled.

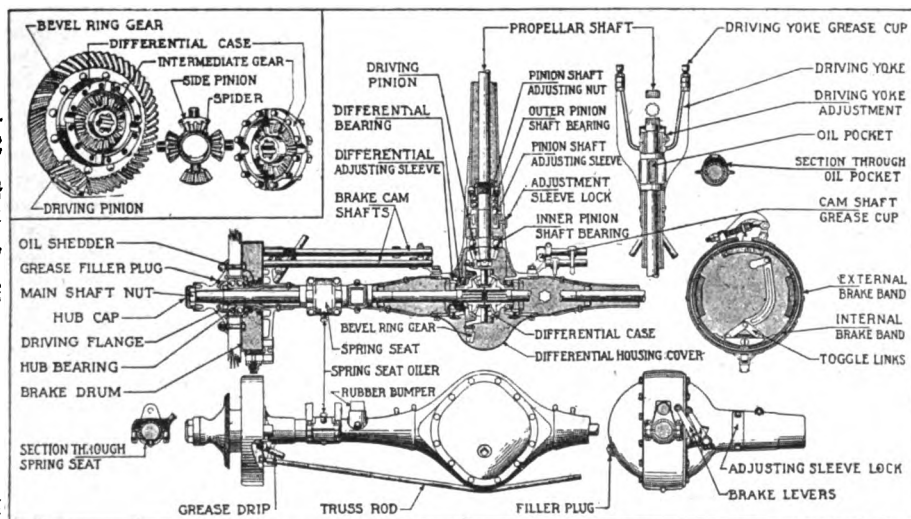


Rear Axle and Drive Shaft Parts: 1, Differential Gear; 2, Differential Thrust Washer; 3, 4, Axle Thrust Plates; 5, Differential Pinions and Spider; 6, Differential Gear Pin; 7, Driving or Propeller Shaft with Universals and Pinion Drive Gear Complete; 8, Universal Joint Bushing; 9, Differential Housing (Male); 10, Differential Housing (Female); 11, Rear Axle and Differential Assembly; 12, Truss Rod.

If only bevel ring adjustment is necessary, the rear axle cover should be removed and the bevel ring adjusted. Take off the collar locks and the whole differential assembly may be shifted to the right or left. If the adjustment of only the bevel ring is not sufficient, the entire axle should be disassembled, all the parts thoroughly inspected and cleaned and the trouble located.

To remove the axle: Use a chain block or hoist. Place horse or block under running board, to prevent injury should the hoist chain break or slip. Disconnect the brake rods at rear of unit power plant by removing floor boards. Next remove the saddles holding the vertical bearings on the driving yoke ring at rear of transmission; then unscrew brass packing collar on sleeve of universal joint at rear of transmission. Remove rear springs from their seats on axle. Now raise and lower the car until the drive shaft slips from the universal and slide the assembly out to the rear. Be careful that the torque tube does not drop on the floor. Use two horses to support the axle, with a third horse to carry the torque tube. It is not absolutely necessary to remove the hub caps, but it may be advisable to avoid having them dented or otherwise injured while the work is progressing. The flange stud nuts holding the driving flange to the wheel hub proper should be removed; then draw the drive shaft out with driving flange attached. Then remove front connections of radius rods to the torque tube. Remove nuts holding main drive shaft housing to the rear axle housing. Now you can pull torque tube forward, removing it from the axle housing. The differential is bolted to this housing and comes out with it.

Removing wheels: Remove locking rings holding each wheel to the axle housing bearing. The thread on the right wheel is left hand and that on the left wheel is right hand. Pull wheel off. The ball bearings are not adjustable, except for a small amount of end play. If they are much worn they should be replaced. The emergency, or internal expanding brake seldom needs adjustment, which is provided for on the brake rods. If the lining is greasy it should be washed with kerosene. In adjusting the service brakes care should be taken that their adjustment is even on both wheels. The



Disassembled Mott Full-Floating Rear Axle Used on Buick and Oldsmobile.

clearance between the band and drum should be about $\frac{3}{64}$ inch all the way around. If it is more the band must be contracted in this manner: Turn set screw on outer brake lever so that the lever connected to the pull rod stands at an angle of about 30 degrees, inclined toward the axle housing. Then loosen adjusting lock nut on rear half of brake band and turn the adjustment nut until the band is concentric with the drum; then tighten lock nut. Turn the wing nut until the clearance between the brake and drum is uniformly $\frac{3}{64}$ inch, snapping the wing nut into its groove before determining the clearance.

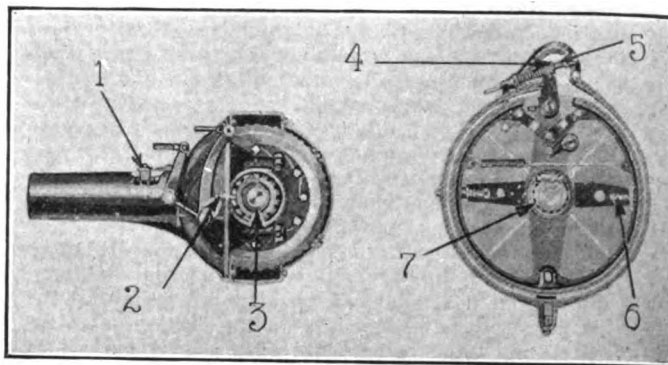
Adjusting the rear axle: Remove straps holding differential to the drive shaft housing. To remove differential: It is usually not necessary to carry the disassembly any further unless the spider gears are worn or another part needs replacing. Wash all parts with kerosene, having the ring and piston gear teeth dry and bright, so that prussian blue may be more effectively used to determine adjustment of any interference of surfaces producing noise.

Removing the drive shaft: Loosen cross pinch bolt at the rear of the torque tube; then remove pinion adjustment corner plate exposing pinion adjustment. Mark with a file the point the drive shaft projects from the torque tube. Turn pinion adjustment to the right until free. Now the drive shaft may be drawn out to the rear. Clean all bearings with gasoline and examine all parts for wear.

For reassembling this unit, replace drive shaft, screw pinion adjustment back until file mark on the drive shaft comes to its former position, which makes the pinion adjustment the same as before. Then replace differential and bolt in place. Remove any end play in the driving yoke by loosening the clamp screw at the end of the torque tube, and turn the nut until the end play is removed; tighten the clamp screw.

Adjustment of the differential: Cover the gear teeth with prussian blue. With the adjusting sleeve locks removed turn the drive shaft as though the car were going ahead. All adjustments should be made on this basis, as the gears are usually working in that direction. Note the appearance of the blued teeth after turning. The teeth should show a broad, even contact across the entire width of driving surfaces. The position of the ring gear should not be shifted unless the position of the bevel pinion is also changed, as one depends upon the other. Shift the adjusting sleeves and pinion adjustment until the two are balancing, giving a broad contact the entire width of the gear teeth. If properly adjusted the ring gear will have no side play, is easily turned and spun without noise. Now replace adjusting sleeve locks, replace differential in housing, then slip and bolt radius rods into place. Now replace wheels, adjusting locking rings so that side play is removed. Replace axles, bolt flanges in place and replace hub caps.

Replacing axle: Before rolling axle assembly beneath car be sure that packing cap and packing are in place on end of drive shaft. Force splined end of drive shaft into universal



Dodge Differential and Brake Arrangement: 1, Adjusting Ring Lock; 2, Differential Adjusting Ring Lock Screw; 3, Differential Adjusting Ring; 4, Locking Nuts; 5, Adjusting Yoke; 6, Brake Shoe Bottom Support; 7, Wheel Bearing Adjusting Nut.

joint at rear of transmission. At least two men are required to do this job, as the car may have to be raised and lowered and the engine worked slightly to permit it to be done readily. Put threads of the packing caps in place and tighten the cap in place. Replace the saddle holding the lower vertical bearings cap on the driving ring, which may be bolted into place until the threads of the retaining bolts catch. Now replace upper vertical bearing cup, lowering the car and attach spring end to axle. Connect brake rods, adjust foot brake rods by the turnbuckles so that the brakes start to contract at the first pressure on the pedal. Remove differential oil plug and fill housing to level of hole with heavy steam engine oil and grease and oil all parts.

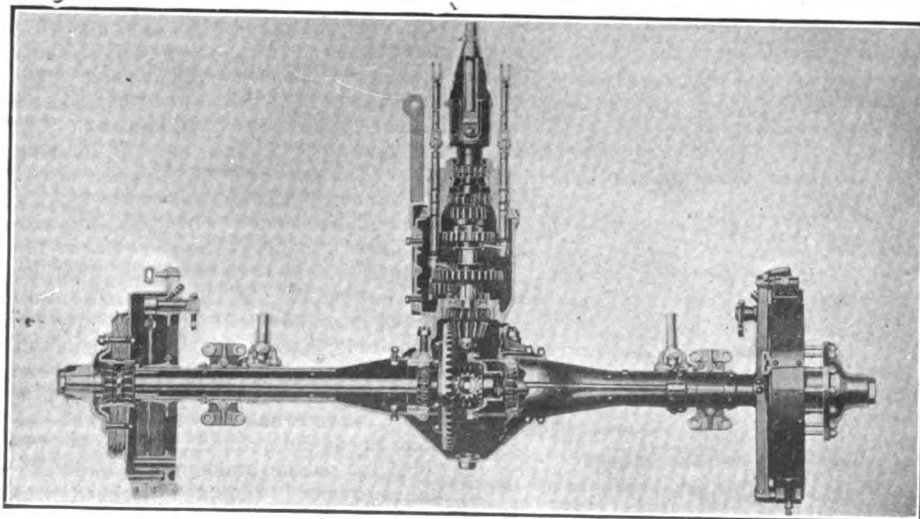
Studebaker Full-Floating Rear Axle.

Its disassembly is similar to that of other types of full-floating rear axles. After the shafts are removed, inside of the wheels will be found a large lock nut, which is kept from turning by means of a washer having a bent over lug. Straighten this bent edge and turn off the large nut. The wheels may then be taken off and the roller bearings examined.

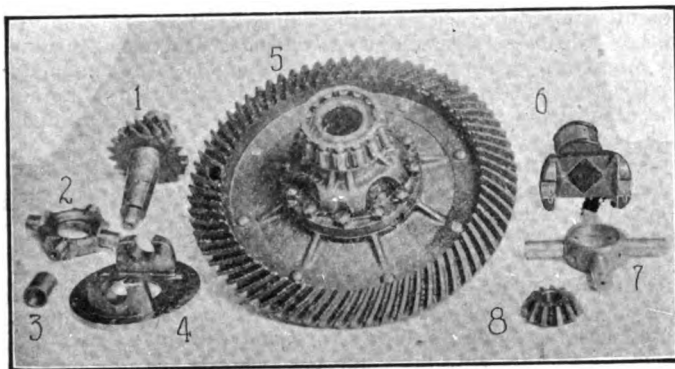
The differential is mounted upon two roller bearings, the outer races of which are mounted in two clamp supports. The two supports are integral with studs, which extend through the front part of the housing and serve to fasten the transmission gearset to the axle. Since these nuts have been removed in taking off the gear case, the supports with the differential may be pulled from the axle through the hand hole at the rear.

After the differential unit has been removed the clamping bolts may be loosened, the clamps and bearings taken off. The differential is held together by eight studs and nuts. Remove the nuts and the differential case may be taken apart, exposing the differential gears and pinions. A careful examination of all of the gears and mountings should be made. If the pinion show signs of wear or do not fit the spider they should be renewed or a new spider substituted.

In putting the differential back into place it is essential that it be set properly in relation to the pinion gear. When the differential is in place the master gear should be set hard against the pinion and the bearing clamping bolts tightened. The adjusting nut, which is located on the outer end of the left bearing, should be turned so as to allow the master gear to clear the pinion gear about $\frac{1}{32}$ of an inch. The adjusting nut on the right side should then be tightened until there is practically no play in the differential. The engine should then be started and, with both rear wheels clear of the ground, the high speed thrown in. The differential should run with



Cross Sectional View of Studebaker Transmission Gearset and Rear Axle.



Cadillac Full-Floating Timken Rear Axle. Universal Joint and Differential Parts: 1, Pinion Gear; 2, Universal Spider; 3, Spider Bushing; 4, Yoke Flange for Universal; 5, Differential Assembled; 6, Sleeve Yoke for Universal; 7, Differential Cross or Spider; 8, Differential Pinion.

little or no noise and adjustment should be made with the adjusting nuts until the gears are meshed to the correct depth. Before altering the adjustment or moving the nuts the engine should be stopped.

Dodge Full-Floating Rear Axle.

The disassembly is practically the same as on the other full-floating rear axles.

The differential assembly is carried in roller bearings which are held in clamps upon the propellor shaft housing. These clamping brackets are fitted with caps, which should be removed, permitting the removal of the differential case with the bearings and races. Four studs and nuts are used for fastening the two differential housings together, when these are removed, the differential may be disassembled. After the differential has been assembled and the brake control rods removed, the cap screws which fasten the drive shaft housing to the rear axle should be taken out and the drive shaft unit pulled from the axle.

To disassemble this unit the pinion gear must first be removed from the shaft. The gear is keyed and held by a nut, and, with the nut removed, may be drawn from the shaft with a wheel puller. With the gear removed the shaft may be drawn from the front end of the shaft.

Both roller bearings are held in place and adjusted by bearing adjusting rings which may be inspected or unscrewed through a hole in the top of the shaft housing which is fitted with the adjusting ring lock.

It is of the utmost importance that the relative positions of the pinion drive and the driven gear are correctly made, or these gears will wear very rapidly and cause much noise and grinding.

After the drive shaft and differential have been reassembled and the rear axle put into place a careful adjustment should be made as follows:

Adjustment of Driving Unit.

Turn down upon the drive shaft adjusting collars until the edge of the pinion gear teeth are in a line with the backs of the teeth on the master or ring gear. Then turn on the differential adjustments until both gears are meshed, or bottomed against each other with the back edges of the teeth forming a smooth line. With the gears bottomed the teeth should not overlap each other on the ends. If the adjustment is left this way the gears will grind, because they are set too tightly together. The drive shaft adjustment should be backed off one or two notches, as should also the differential adjustment, permitting a clearance between the teeth of between .006 and .009 of an inch. After the adjustment has been made the collars should be locked. There should be no play in either the differential or drive shaft when a proper adjustment has been made.

Cadillac Full-Floating Rear Axle.

The rear axle, together with the differential and drive shaft, may be removed, without disturbing the housing or wheels. First remove the wheel hubs exposing the axles which drive through spiders and may be drawn from the car.

The flange which attaches the drive shaft housing to the

rear axle housing should next be removed, bringing with it the drive shaft, universal joints and differential assembly.

After the rear universal joint has been disassembled and the nut removed from the pinion gear shaft, the universal joint flange may be pulled from the pinion shaft. The front roller bearing is fastened into place by a cover plate, which may be removed and the bearing taken out for examination.

Examining Differential Assembly.

The pinion gear is made integral with the shaft and removed from the rear after the differential assembly has been taken out. The differential assembly is mounted upon two bearings, one on each side, which are fitted with adjusting nuts. Remove the two caps which are bolted to the housing, releasing the bearings and adjusting housings together with the differential. This applies to models 55 and 57. The outer races of the roller bearings are adjustable by two sleeves, which are threaded into the housing, the sleeve on the front bearing turning out toward the front, and the rear sleeve toward the inside or rear.

On models 51 and 53 the front bearing is very similar and is fitted with a threaded adjustment, which is mounted inside a housing upon which is fitted the roller bearing for the front of the pinion gear shaft. This whole assembly of two bearing adjustments is mounted in the big housing and fitted with a threaded adjustment by which the relation between the pinion and master gears may be altered. In disassembling this type of axle the outside adjustment is taken off first, then the others in turn toward the inside.

An adjusting collar upon each side of the differential assembly permits the adjustment of this unit. In making the adjustment between the master and pinion gears a good plan is to attach a crank (of wood or iron) to the pinion gear shaft so that the pinion may be turned rapidly by hand. The various adjustments should be made so that the two gears are meshed deep enough to prevent all but a little play. When properly adjusted the backs of the gears should be flush with each other. The crank may then be turned by hand and the adjustments made until the gears do not bind at any point.

When the gears bear the proper relation to each other the two adjustments on the differential should be brought near enough together to prevent side play. The same should be done with the front bearing which carries the pinion gear shaft. When making roller bearing adjustments the rolls should not be clamped too tightly and there should always be a very slight amount of play in the bearing or it will wear extremely fast.

The above statement relative to adjusting roller bearings applies to the wheel bearings as well as those in the differential. Both the rear wheels are held in place by two large nuts with a lock washer between. When the car is jacked up the nuts may be removed from the housing, then the lock washers, then the adjusting nut. When the nuts and lock washers are put back into place, if the lock washer cannot be fitted with the inside nut as originally adjusted, it is best to unloosen the nut rather than to tighten it. The front wheels are mounted in practically the same way, and what is true of the rear wheel bearing adjustments is true of the front.

The Three-Quarter Floating Rear Axle.

The three-quarter floating rear axle is also known as the "flanged type." Its housing extends into the hubs of the wheels, as in the full-floating type. The driving shafts are connected rigidly by flanges with the wheels so that the shafts take nearly all of the bending stresses and all the torque.

Maxwell Three-Quarter Floating Rear Axle.

The rear axle and drive shaft may be drawn from beneath the machine after the brake rods and spring clips have been removed. The drive shaft tube is fastened to the axle housing by four studs; remove the nuts and the housing may be taken from the shaft. Remove the set screw which holds the roller bearing outer race in the tube and drive the shaft and bearing assembly from the tube. The pinion gear, held to the shaft by a nut, and kept from turning by a key, may be pulled from the shaft after the nut has been removed, releasing the roller and thrust bearings. With the bearings and races in place there should be no play between the back of the pinion gear and the thrust washer. Should there be play a thicker washer should be fitted.

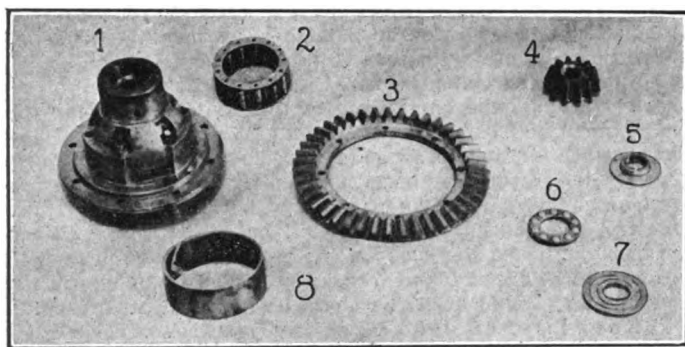
The upper end of the drive shaft housing should be examined and if the bearing is worn it should be replaced with new. The housing, as well as the rear axle casing should be given a careful examination at all of the housing joints. Welding is found to be the best sort of a repair where the housings are riveted together.

The wheels are removed by taking off the hub caps, unscrewing the shaft nuts and pulling them from the shaft with a wheel puller. When freed of the wheels the rear axle should be put across two boxes or horses. Take out the bolts at the center of the housing and slip the two parts of the housing from the differential and shaft assembly.

Six nuts on the ends of studs fasten the two parts of the differential together. When these are removed the differential gears are exposed. The differential pinions, which are mounted on a three-point spider, should fit against the differential gears very closely and with very little lost motion.

The differential gears are held to the shafts by split rings and keys. Drive each gear back about $\frac{1}{4}$ inch, expand and remove the split ring. The gear may then be pulled from the shaft. When the differential is assembled any play may be compensated by fiber washers placed between the case and the gears.

The master or drive gear is held to the case by cap screws and seldom shows signs of wear, except in old cars.



Maxwell Differential Parts: 1, Differential Housing Assembled; 2, Roller Bearing; 3, Drive or Ring Gear; 4, Pinion Gear; 5, Differential Thrust Bearing Outer Race; 6, Thrust Bearing Retainer with Balls; 7, Inner Race; 8, Roller Bearing Outer Race.

The fastening screws should be examined and if there is play or the gear is loose on the housing, the screws should be replaced with new to assure a tight fit.

Differential Support and Bearings.

The differential is supported in the axle housing and rotates upon two roller bearings. These bearings should be examined carefully and the differential tried in place for lost motion or play. The bearing outer races, if removed, should be replaced with new, as the removal usually damages them to such an extent that their usefulness is impaired.

The same treatment is also true regarding the roller bearings at the outer ends of the axle. To take up the thrust of the wheels and drive the differential has a ball thrust bearing at each end. It is essential that this bearing be fully seated, or the shafts will be thrown out of line and excessive friction result.

A careful examination should be made of the brake bands and should they show signs of wear they should be replaced with new. If the facings are not worn, but are filled with oil and dirt, they may be washed with kerosene oil.

After the machine has been reassembled the axle should be raised on jacks and the brakes tried. Each wheel should be turned with the same brake setting and the friction of each band set to equalize that of the band on the opposite wheel.

Chevrolet Three-Quarter Floating Rear Axle.

The rear axle should be placed upon two horses or boxes for disassembling. With the axle in this position the hub caps and wheels are first removed. The nut on the end of the rear axle truss rod can then be removed from the housing.

The bolts at the center of the axle housing are next taken out and the two sections of the housing slipped from the dif-

ferential and shaft assembly. The differential is held together by three studs and nuts, the nuts held from turning by a length of wire through the three studs. The wire should be cut, the nuts removed and the smaller part of the differential case removed, exposing the differential gears, the pinions and permitting their removal.

The differential gears are held to the shaft by a split ring, which is removed by driving the gears back upon the shaft about one-quarter of an inch. After the ring has been removed the gears can be drawn from the shafts.

Any play or lost motion between the differential gears and differential pinions should be compensated for by inserting the proper thickness of fiber washer between the differential case and differential gears, being careful to keep the washer on either side the same thickness as the one on the other.

The roller bearings on the inside of the housing at the center of the rear axle slip out of the outer races, or so called differential bearing lining with the axle, and these can be removed after the differential has been disassembled. The replacement of the old outer race once it has been removed is very difficult, for removal is quite certain to distort it. If for any reason the race is removed it should be replaced by a new one. The outer race of the roller bearings at the outer end of the housing being held in by a set screw may be removed, often without damage, if care is exercised.

Hupmobile Three-Quarter Floating Rear Axle.

In making repairs and adjustments on the rear axle it will be unnecessary to remove the whole housing, for the differential may be removed without disturbing the wheels or removing the springs. The first step is the removal of the bolts holding the wheel flanges to the wheels, then these are taken out, the driving flanges, together with the axles, may be taken from the car.

The differential assembly is mounted on the casing, which carries the pinion gear and rear universal. The nuts should be removed and this casing taken out of the rear axle housing. Both the pinion gear and differential assembly are mounted on ball bearings. Two caps, which are retained by two nuts each, hold the differential bearings in place. When these are removed the differential housing may be lifted out, together with the bearings, which may be taken from the housing. Eight cap screws fasten the two parts of the differential housing together; remove these and the differential is disassembled.

In removing the pinion gear assembly with bearings the first step is the removal of the gear with a wheel puller. This gear is keyed to the shaft and retained by a lock nut, and when removed the shaft may be slipped from the bearings. The front bearings are retained in an adjustable collar, which may be unscrewed from the housing, while the rear may be driven from the housing with a wood or metal bar, taking care to drive upon the outer race.

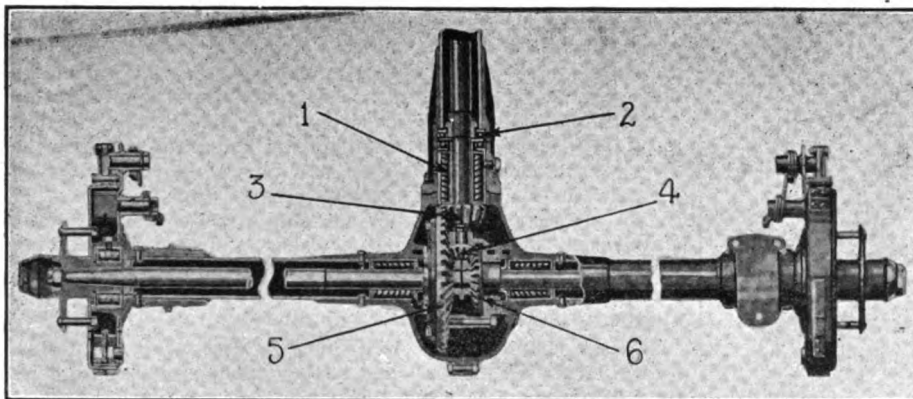
Examination should be made of all bearings in the rear construction, and should the bearings or bushings show wear replacement is advisable, for any looseness will be evidenced by the groaning or grinding of the axle while the car is in motion.

Pinion and Drive Gear.

The proper adjustment of the pinion and drive gear is a matter of extreme importance and this adjustment is made very easily upon either of the models N or K. The differential should first be assembled together with the pinion gear and shaft. It is essential that all of the bearings are clean and bottom against their respective seats.

To the universal joint flange upon the pinion shaft fit a wooden handle so that this shaft can be turned by hand, then turn the pinion adjustment until there is no play in the shaft. The shaft must not bind, however. The backs of the pinion and master gears should be together and a slight amount of clearance left between the gears. The pinion shaft should then be turned and the results noted. If the gears bind the differential adjustments should be made to carry the gear farther away from the pinion.

When the adjustments have been made properly there will be no bind and but little lost motion. The two differential bearings should then be tightened and the lock screws



Chevrolet Rear Axle Partially Cut Away: 1, Propeller Shaft Roller Bearing; 2, Ball Thrust Bearings; 3, Pinion Gear; 4, Differential Pinions; 5, Master or Drive Gear; 6, Differential Gear.

put into place. The differential and pinion assembly may then be returned to the rear axle housing.

Paige Three-Quarter Floating Rear Axle.

Block the front wheels and raise the rear wheels clear of the floor. There are several ways of doing this, but one of the best is by means of a chain block and sling underneath the rear of the frame.

Disconnect the drive shaft at the universal and the brake rods at the rear axle. Remove the rear spring hangers and loosen the spring clips holding the axle to the spring. The rear axle can now be slid out from under the car.

Remove the hub caps and nuts from the ends of the axle. Use a wheel puller to remove the wheels. Remove the truss rods. Remove the brake rods. Remove the nuts holding main drive shaft housing to the rear axle housing. Pull torque tube forward, removing it from the axle housing. The differential is bolted to this housing and will come out with it. This assembly should now be clamped in a vise and taken apart for inspection.

All parts should be washed carefully in kerosene. Examine the bearings to see if they are in good condition. Inspect the gear teeth and if these are found to have backlash after adjustment they should be replaced by new ones. The main point is to note throughout the assembly that all nuts and bolts are tightened. This will insure thorough quietness in the operation of the rear axle. In assembling the universal joint and rear axle all should be repacked with grease.

Overland 79 Three-Quarter Floating Rear Axle.

The disassembling and reassembling of this axle is similar to the other three-quarter floating axles. The side thrust of the differential is taken up by a ball thrust bearing on either side. Leakage of the differential lubricant through the axle tubes is prevented by a spring-pressed felt washer. When it is necessary to adjust the mesh of the large bevel gear and the drive pinion, the operations are as follows: Take the cover from the differential housing. With a screw driver remove the thrust bearing adjustment lock on the side toward which the differential is to be removed and turn the adjusting cup of the thrust bearing in the same direction. Now loosen the two screws that hold the split differential adjustment collar until the collar may be turned in the desired direction. Moving the collar on one side of the differential makes it necessary to adjust the one on the opposite side accordingly, both axle shaft ends having right-hand threads. When the proper mesh of the gears is obtained, tighten both collars and follow by bringing the thrust bearings close to the adjusting collars. Be sure to tighten all screws and to replace the small locks which keep the cups from turning.

To remove the axle shafts, loosen the screws of the differential adjusting collar until the threaded portion of the shaft may be withdrawn through the collar. To remove the differential, withdraw the axle shafts, as explained in the preceding paragraph, and remove the roller bearing caps. The differential may now be lifted out.

In reassembling be careful to mesh the bevel gear correctly and to adjust the ball thrust bearings properly, though not too tight, against the differential adjustment collars. If

necessary, renew the grease-retaining felt washers.

This type of steering gear generally has two adjustments. One operates on the worm, the tightening of which eliminates up and down motion of the worm, and the other adjustment is in the form of an eccentric bushing that supports the steering arm and wheel. The first adjustment is usually by a nut on top of the steering gear housing. By screwing the nut down the thrust bearings are brought together and up and down motion is removed. The eccentric bushing, generally held in adjustment by a locking bolt, permits the wheel to be turned into the worm, giving a closer engagement of the teeth and taking up the lost motion.

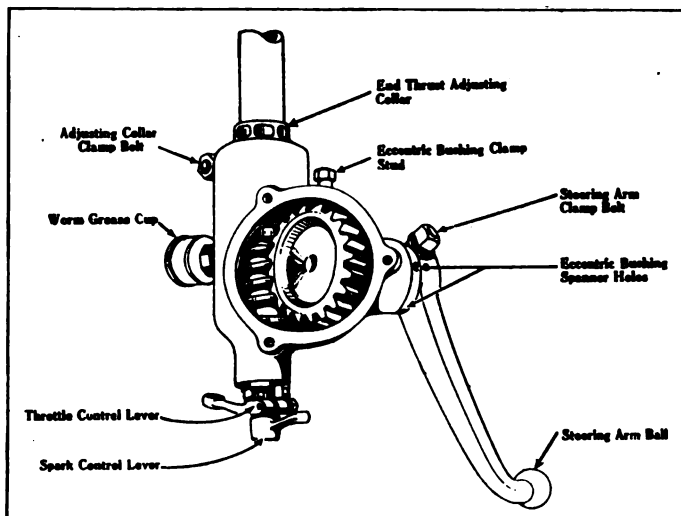
Adjustment of Overland Worm and Wheel Steering Gear.

To correct the wear or lost motion in this type of steering gear (Overland used as example), first loosen the clamp bolt which clamps the steering column adjusting nut and turn notched adjusting nut (see illustration) to the right until all up and down motion of the steering column has disappeared. Next turn the steering wheel to the extent of its travel in either direction, and, after loosening the nut on the eccentric bushing and clamp stud (see illustration) turn the eccentric bushing until all motion between the worm and worm wheel is taken up. Then clamp the sleeve tightly again. It is advisable to make this adjustment with the wheel turned to the extreme position because of the fact that the most wear occurs on the worm wheel in its position when the car is being driven straight ahead. If it were so adjusted that no motion were present at this point in its travel, it would be impossible to turn the wheel far in either direction without its binding excessively. If it is impossible to remove the lost motion between the worm and worm wheel by adjustment of the eccentric bushing, remove the steering arm from the squared worm wheel shaft, and after rotating the worm wheel through a quarter of a turn replace the arm in the new position. This will present a new surface for wear. Then make the adjustment as instructed before and carefully tighten the eccentric bushing clamp stud.

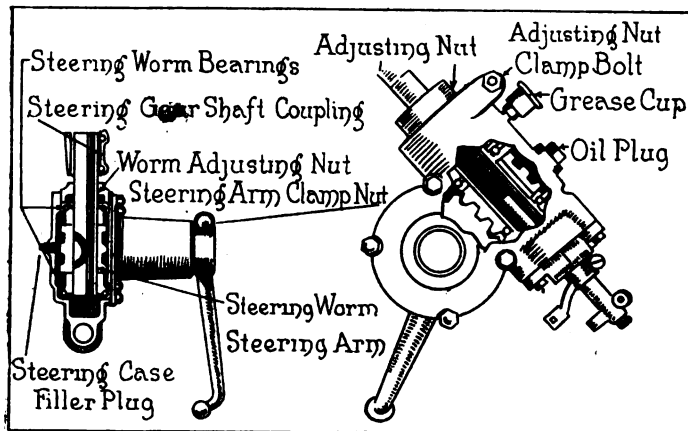
The same type of steering gear is used on the Studebaker and Hudson, and the adjustments are practically the same.

Adjustments of Worm and Worm Steering Gear.

Maxwell steering gear as example: If an excessive amount of end play or lost motion exists, remove the two upper bolts in the steering gear shaft coupling and pull the steering wheel and shaft upward. Then unscrew the steering arm clamp nut and remove the steering arm with the worm and wheel shaft. The steering gear worm adjusting plug



Sectional View Overland 79 Worm and Wheel Type Steering Gear.



On the Left, Maxwell Worm and Worm Type of Steering Gear; on Right, Studebaker Worm and Wheel Type.

clamp screw should then be loosened and while turning the steering gear with a hand on the coupling about a quarter turn to the right and left, tighten the plug until the play is taken up. If there is lost motion in the steering wheel, remove the steering arm and turn the wheel until the steering arm clamp has rotated a quarter turn and replace the steering arm, thus giving the gear and worm a new bearing surface. The filler plug on the side of the housing is for the admission of soft cup grease, and the easiest way to fill the housing with lubricant is to force it in with a grease gun.

Dodge steering gear as example: To take up end play in the worm shaft of the steering gear, loosen the gear shaft connection and the set screw and check nut on the adjusting nut at the top of the steering gear case. Then screw this adjusting nut down until all play is removed. Care should be taken not to tighten the nut so much that the steering gear will bind; then be certain to tighten all parts you have loosened. To remove any play that may develop between the worm and worm wheel, the adjusting plate of the worm wheel shaft eccentric bushing can be turned until the worm wheel is driven into closer mesh with the worm. After much wear further adjustment can be made by reversing the adjusting plate. After long usage the steering lever arm can be disconnected and the worm turned end for end and reinserted. Pack the steering gear case with grease every 1000 miles.

The Chalmers and Saxon use the same type of steering gear and the adjustments are practically the same as those on the Maxwell or Dodge.

Adjustment of Worm and Nut Type Steering Gear.

This type has one adjustment, which is in the form of a nut on top of housing, locked with a locking bolt, which applies pressure to the nut by drawing together a slotted portion of the casting. In this type there are two half nuts that surround the worm. The adjustment removes up and down motion in these half nuts. When the adjustment cannot be made with the nut, the worm may be reversed and a new bearing surface will be created, which adjustment is not possible in all makes.

Buick worm and nut steering gear as example: The steering screw is provided with a ball thrust bearing at its upper end and an adjusting nut, by means of which lost motion may be taken up. The manufacturers recommend that the steering wheel should not have over $1\frac{1}{4}$ inches of lost motion in its rim. The adjusting nut is turned down to take up play.

An oil plug is provided in the gear housing and the housing should be kept constantly filled with heavy flowing oil. A smaller oiler is in the hub of the steering wheel, which lubricates the upper bearing of the steering tube. A few drops of oil should be inserted here every 500 miles or so. The ball joints of the steering connecting rod should be kept packed with a soft cup grease, one cupful to be screwed down until empty, about every 5000 miles.

The Oldsmobile, Paige and Hupmobile use the same type of steering gears and the adjustments are practically the same.

Adjustment of Chevrolet Steering Gear.

This is the worm and worm wheel type of steering gear,

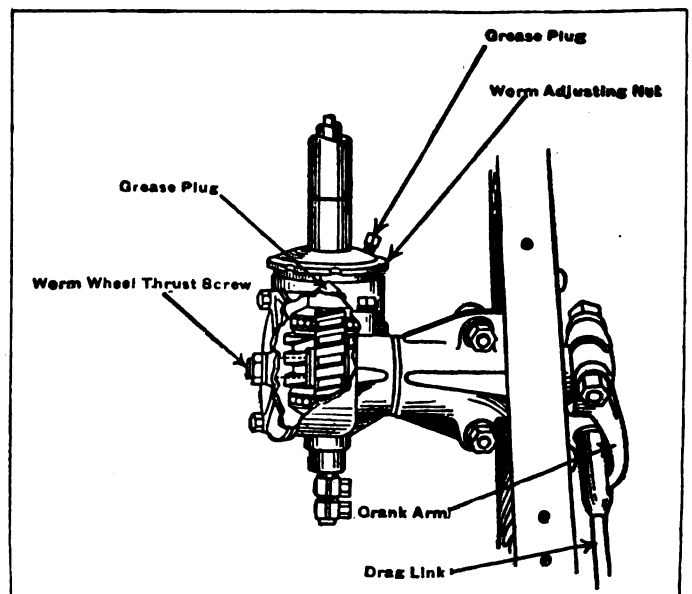
in which the worm on the steering gear shaft meshes with a worm wheel to which the crank arm is attached. To take up end play in the worm shaft loosen the adjusting nut clamp bolt (see illustration) and screw down the worm adjusting nut until all play is removed without binding the steering gear. Be careful to tighten nut clamp bolt after securing the proper adjustment. To adjust end play in the worm wheel tighten the worm wheel thrust screw. Should neither of these adjustments take up the play, remove the steering crank arm from the worm wheel shaft and turn the steering gear hand wheel one-quarter turn. When worm and wheel gear teeth become worn, after considerable use, turn it one-quarter turn and new teeth will come into action.

Grease should be put into the gear case every 250 miles. Every 500 miles the ball and socket connection on the drag link (connection between the steering crank arm and front axle) should be packed with grease. Looseness in the connection can be removed by tightening the screws in the end of the drag link tube, taking care to replace the cotter pin after making this adjustment.

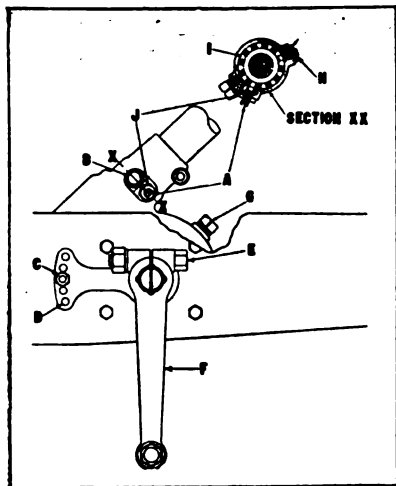
Cadillac Worm and Sector Steering Gear.

The internal mechanism is oiled at B and G after taking out the plugs, using rear axle oil and flake graphite. Two principal adjustments are provided: The first is to take up the end play in the steering shaft. When this occurs, loosen the jamb nuts J and K and set screws A and H. Then with a screw driver or something else suitable, turn up the adjusting collar I, which can be seen through the hole from which the plug B was removed, until the proper adjustment is made. Lock screws A and H are positioned in the steering gear housing so that when one is directly over a slot in the adjusting collar I the other is between two slots. Therefore, after adjusting the collar I it will be necessary to select the proper screw for locking the adjustment. Both lock screws should be held from turning by locking the jamb nuts.

The second adjustment is for taking up wear on the teeth of the worm and sector. The sector has its bearing in an eccentric steel bushing and should wear occur it may be taken up by turning this bushing so that it throws the sector closer toward the worm. To do this proceed by first removing the locking screw C; then remove the arm D, thereby turning the eccentric bushing until the play between the teeth of the worm and sector is taken up. If the wear on the teeth of the worm and sector is very great it will be necessary to remove the steering arm F and to place the arm D in a different position on the hexagonal end of the eccentric bushing in order to bring the arm D in position so that it can be locked by the screw C. After properly making the adjustment be sure that the lock screw C is replaced and tightened. An adjustment is provided on the inner face of the steering gear housing for taking up end play in the sector



Sectional View of Chevrolet Worm and Wheel Type of Steering Gear.



Sectional View Cadillac Worm and Sector Type of Steering Gear.

bolts and oil or grease joints. On some universal joints the housing enclosed by the leather boot is a small, cylindrical sleeve held by four set screws. Remove these and the sleeve may be slipped off the universal joint, leaving it free to be cleaned. Remove all old oil and put in new grease. Should a knock or rattle be noticeable it will be necessary to disassemble and rebush the joint. In such a case it may be advisable to order a new part rather than go to the expense of repairing it.

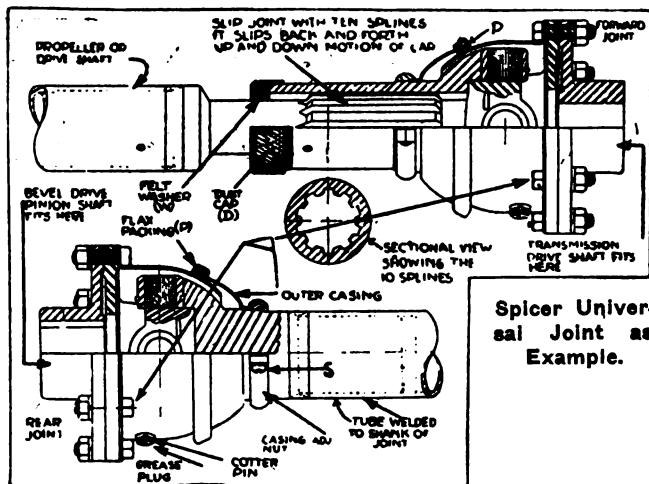
Spicer universal joint as example: Remove the grease hole plugs at every 1000 miles and fill about two-thirds full with heavy gear oil or light cup grease. The forward universal joint is provided with a dust cap (D) and felt washer (W) on the rear end of the sleeve, into which the end of the propellor shaft slides. Occasionally turn this cap to the right in order to keep the felt washer tight and prevent the leakage of grease. Both joints have flax packing (P) between the two parts of the pressed steel casings. This packing can be tightened by loosening the blind screw (S) and turning the casing adjusting nut or ring in a right handed direction. If the packing in the front universal joint is allowed to leak grease the joint will unduly wear for the lack of grease and the escaping grease will be thrown onto the emergency brake, making the brake inoperative.

An O will be found on propellor shaft tube upper end and another O will be noticed on the shank or rear end of the forward universal joint. When propellor shaft and universal are assembled these two O's must be in line, as shown in upper half of illustration; otherwise the transmission bearing will be subjected to undue strain and wear.

When assembling the universal joints care should be taken to see that the holes in the flange and the inside casings are matched in such a way as to bring the oil hole, which is closed by a threaded plug, opposite an open space in the joint, and not opposite one of the lugs, which would obstruct

shaft. To make this adjustment remove the locking arm and turn the adjusting screw in until the proper adjustment is made, after which the locking arm should be replaced and the lock screw replaced and tightened.

The universal joint is a flexible coupling that transmits power from the clutch to the propeller shaft. To disassemble it remove the leather boots if any are furnished. Ascertain whether the universal has any backlash and tighten if possible. Tighten all



the grease entering the hole, the intention being that by removing this plug the user of the car can at any time inject additional oil or grease by the use of an ordinary grease gun.

Adjustments of Front Axle Bearings.

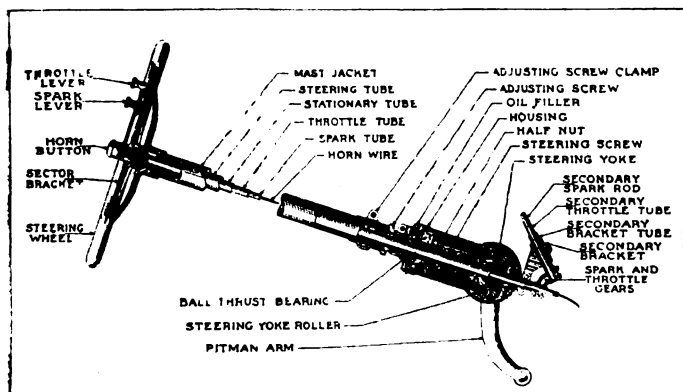
About once a month the wheels should be jacked up and the adjustment of all bearings tested and also alignment of front wheels tested.

Removing and adjusting front wheel: Jack up the wheel and take off the hub cap; then draw cotter pin (Fig. 1) and unscrew bearing cone lock nut. The lock nut on the right hand wheel, as viewed seated in car, has right-hand threads and to unscrew turn to the left; the lock nut on the left hand wheel has left-hand threads and to remove turn to the right. After lock nuts have been removed the wheel may be easily pulled off, as the cone merely slides on the spindle. Before replacing the wheel examine the felt washer, and if badly worn or damaged, replace with a new one after prying out retaining washer.

Method of adjusting ball bearings: In replacing the wheel, press the cone in as far as possible and slide on the retaining washer, then turn the cone until the lug on the washer fits into the recess on the back of the cone to prevent its turning. Now tighten up the lock nut until the wheel has no perceptible side play on the spindle, but still revolves freely; then replace cotter pin and hub cap. If grease runs out between hub and steering knuckle the cause is due to either too much grease or a defective felt washer. To ascertain whether the bearings require adjustment, jack up the wheels and rock the wheels sideways and if there is any loose side sway in them the bearings should be adjusted.

Method of adjusting roller bearings: Turn the bearings up tight (Fig. 2), then revolve the wheel a few times by hand; then slack off the nut a little so that by grasping a spoke above the hub and one below, a very slight shake in the wheel is felt; then turn the nut up again slowly until the shake disappears and the wheel revolves freely. A practical means by which to put the bearing into position is to slip a short length of pipe over the spindle, against the inner shell of the bearing, and then drive the bearing to its proper place by hammering on the pipe.

(Continued on Page 47.)



Buick Worm and Nut Type of Steering Gear. Adjustment is Made by Turning Down the Nut on Top of Housing.

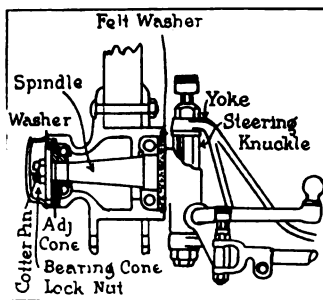


Fig. 1—Adjustment Front Axle Bearings.

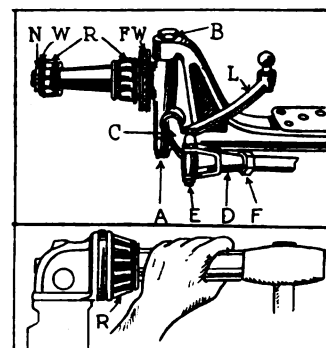


Fig. 2—Upper Illustration, Driving Bearing Into Place.

ACCESSORIES, SUPPLIES, PARTS, TOOLS AND EQUIPMENT

As foreshadowed by developments of the past Winter and Spring, higher prices on all automobiles have gone into effect and with the recent announcement of a big curtailment in the production of new cars, even higher prices are inevitable, a fact stated elsewhere in this issue, and which means that thousands of used cars will be restored this year to meet the demand for cars, and that thousands of owners will renovate and rebuild their present machines.

In rebuilding, renovating, overhauling or bringing up to date the used car the use of more or less accessories, supplies, parts or equipment is necessary. To facilitate the selection of these things there has been classed in this section, descriptions and illustrations of numerous articles and various supplies and materials that are used in rebuilding or

overhauling a motor car, and they are grouped under three classifications for convenience.

Under the head of accessories are grouped such articles and devices that while necessary and useful as equipment on the car, do not constitute really an integral part. As supplies and parts are classed the articles which go into the car to restore worn out wearing parts or to facilitate the actual mechanical operation of the car, and under the caption of garage equipment are enumerated the devices and tools considered essential and necessary in accomplishing the work involved in completely overhauling and restoring an automobile.

This latter list is quite comprehensive, but it is not intended to convey the idea that all this equipment is essential

in overhauling the automobile in a private garage, it being kept in mind that the suggestions offered would be valuable to garage repair men, as well as men who operated a number of cars, and would find it economical to have every facility for saving time and money in doing their repair, overhaul or refitting work.

A large number of articles and products are classed under these various heads and include many devices, which, when installed on the car improve its appearance, as well as increasing its value from an intrinsic, as well as service viewpoint. Many persons deceive themselves in the belief that they are beating the game by letting the car wear down to the last thread, so to speak, but discover their mistake when they come to sell it or trade it in.

ACCESSORIES SECTION

The Smith Auto Signal, manufactured by the Smith Signal Corporation, 53-55 West 66th street, New York City, is a most practical and efficient safety device to meet the dangers presented by congested traffic. The Signal is placed on the left rear fender or mudguard (or panel or body in the case of commercial vehicles and trucks) by an adjustable nickel plated flange. Four nickel knobs are furnished instead of joint and flange where owner prefers. This Signal shows left, right or stop two sides, i. e., both the front and to the rear. The left rear fender is the logical place for the Signal as it is seen by all cars following from the rear, or cars approaching from the front, as well as by the traffic policeman, who is always to the left of cars approaching him. This Signal shows both day and night, and is just as necessary for driving outside of the cities as in cities.

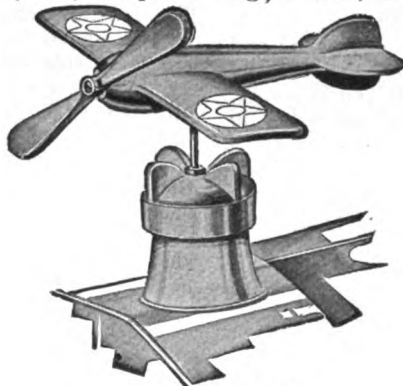
Operates for left, right or stop only at the will of the driver, from a single handle, three-way switch attached to the steering shaft at the tip of the fingers or any place most accessible to the person driving. Indicates what you intend to do before you do it. Buzzer in the switch-tell-tale that Signal is performing its function. Signals through red ruby glass 5x6 inches. Individual illumination of the three words left, right, or stop by 6-8 volt, 10 candle power bulbs. Simply constructed, no moving parts to get out of order. Easily attached, directions with every Signal. Each Signal complete with switch, buzzer enclosed in switch, suf-

ficient weatherproof wire, tape and staples. Packed in individual carton ready for shipping.

Distributed in United States by Weiss & Sinclair, 53-55 West 66th St., New York City. Write for literature and prices.

"The Liberty Plane" is both one of the latest and most attractive radiator ornaments and is new and original. It suggests patriotism in a manner that is easily recognized, pleasing, yet different. It is an exact miniature of the aeroplane, cast in aluminum, highly polished and decorated with the flying emblem in red, white and blue enamel on each wing. It will not wear out and is weatherproof.

Marketed by the Defender Auto Lock Co., Inc., Marquette Bldg., Detroit, Mich.



The Liberty Plane.

The "J. H." Tonneau Shield is adaptable for use on any car built. It is mounted on a pair of extending steel arms, which are attached to a pair of steel body irons, which in turn fasten securely to the frame of the front seat beneath the upholstery. When once raised a push enables one to open or close the shield and place in whatever position desired, whereupon it is held by the friction locks. The side wings are simply turned to whatever position desired and they lock by friction. Placed at an angle they deflect the wind. When the shield is not in use it folds against the back of the front seat, taking about the same amount of room as would a robe.

Manufactured by the "J. H." Tonneau Shield Co., New York City, N. Y. Write for prices.

The Shurnuff Windshield Ventilator consists of two black enameled metal uprights attaching to the hinges in the center of the present Ford windshield and fastening to the cowl where the present windshield castings are set. These uprights are so shaped as to make the sides of the shield rain proof. A metal and rubber strip is provided, which, when fastened to the cowl, makes it rain proof at the bottom, and a metal handle is also furnished for attaching to the lower sash in order that it may be pulled backward. Four small plates are furnished, same being attached to lower corners of 1915-16 and early 1917 shield only.

Manufactured by the Shurnuff Manufacturing Co., St. Louis, Mo. Write for prices and literature.



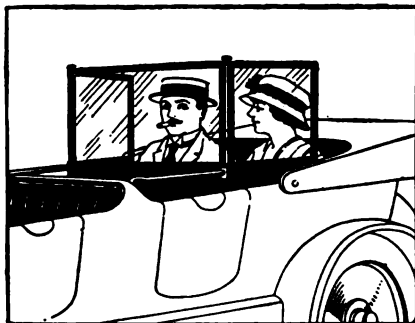
The Shurnuff Windshield Ventilator.



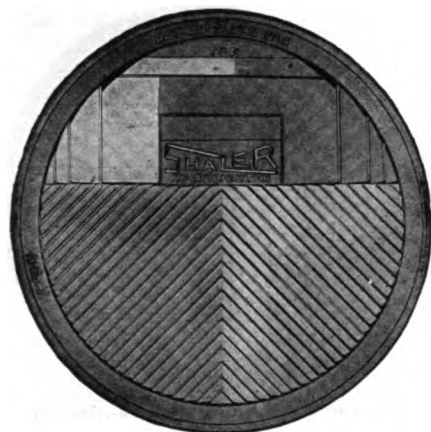
Smith Auto Signal.



"J. H." Tonneau Shield.



(When Writing to Advertisers, Please Mention The Automobile Journal.)



The Shaler Roadlighter.

The Shaler Roadlighter, in the opinion of motorists who have used it, does not owe its value so much to the fact of its compliance with anti-glare laws as to the fact that with it they can drive without annoyance or danger from the blinding headlamps they always meet on night trips.

Roadlighters take the waste portion of the light, which ordinarily shoots upward above the headlights, and concentrates it on the edge of the road. The effect is the same as using a spotlight on each side of the car in addition to the usual penetrating beam from the head lamps. With this sort of illumination one can see the road right through the glare of headlights he meets and turn out to pass with the same confidence he would in the day time.

While the Roadlighter is approved in every state where approval is required, it is not merely a means of complying with the law, but a protection against drivers who ignore the law. No glare is produced even when the largest bulbs are used. The road is illuminated from fence to fence. The distance light is intensified. Fog penetration is secured without discoloration of light.

Manufactured by C. A. Shaler Co., Wausau, Wis. Write for literature and prices.



Crew Levick Fractor.

The Crew Levick Fractor consists of a heavy half tone of glass, which is cast with wedge shaped projections around the circumference. The glass is mounted upon a ring which fits over the bulb. Due to the peculiar construction of the glass and its refractive power, the Fractor bends all the rays of light so that they are reflected to the roadway where needed.

Made by the Crew Levick Co., 111 North Broad St., Philadelphia, Pa. Write for literature and prices.

The Raydex Glassless Lens is an all-metal cellular device that is put in the upper half of the head lamp, behind the regular glass door. It contains more than 9000 small metal reflectors, approximating nine square feet of highly polished reflecting surface. Its object is to deflect those rays which normally rise above the 42-inch level and cause glare, and to project them instead upon the roadway where they are wanted. The principle of construction is said to make it transmit 93 per cent. of the headlight's candlepower.

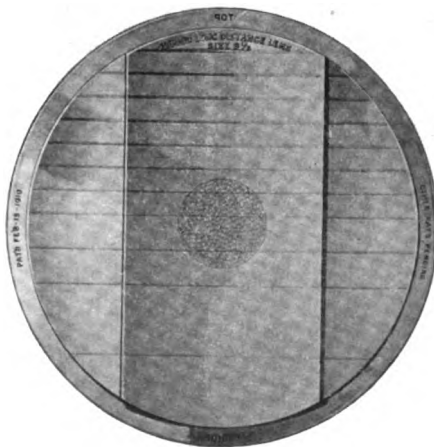
Manufactured by the Omolite Co., Jamestown, N. Y. Write for prices and literature.

MOST USED CARS MUST HAVE LATEST HEAD LIGHT LENSES.

Laws in Many States Now Compel Motorists to Employ Regulating Devices to Guide Light Rays.

One of the essential changes necessary in overhauling and refitting the used car is that of the plain lens in the head lamps to the new type of regulating lenses, or one of the other types of regulating devices. Nearly every state has adopted a law prescribing the use of the regulating lens or device. Gradually the dangers in driving motor cars are being reduced to the minimum. The general adoption of headlight dimmers, or light regulators, is rapidly being required by uniform state laws and thus one of the greatest dangers in driving is overcome. The laws adopted by New York and Massachusetts require that headlights throw the light not more than 42 inches from the ground at a distance of not less than 75 feet ahead of the car. These requirements overcome the direct glare of the light into the face of the driver and passengers in a car coming from the opposite direction. Practically every well known headlight regulating lens or device now on the market is designed to meet the headlight laws of the various states.

The headlight regulators are divided into several classes. The more extensively used are specially designed headlight lenses. By prismatic effects, ribs, stars, beveled edges and other methods the lens breaks up the direct rays which illuminate the road below the 42-inch limit, and refract them to a restricted area. Another type of dimmer devices are attached to the head lamp electric bulbs and are preferred by many drivers. They can be regulated from the seat to either refract or reflect the light as desired. Another method of light regulation is obtained in tipping the lights upon the approach of another car. By this means all the light rays are thrown upon the road ahead, giving sufficient driving light, but no light in the face of an approaching driver. In a class by themselves are visors or screens, which absorb or reflect the light after it has passed through the lens. This type is stock equipment on a few cars.



The Osgood Lens.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



The Conaphore.

The Conaphore is a typical headlight glass of the first class and is obtainable in sizes ranging from five to 11½ inches in diameter, and in either plain or Noviol glass. Across the front of this glass are a series of horizontal prisms which refract the glaring beams and direct rays of light downward. A second series of squares, arranged in semi-triangular formation and extending over the center of the glass, are designed to reflect light towards the sides of the road. All of these prismatic panes are cast into the glass and being on the inside do not collect the road dirt and dust. The front is perfectly smooth. The Noviol glass being of yellowish tinge, absorbs the glaring rays of blue and violet and permit only the non-glaring rays to pass.

Marketed by Conaphore Sales Division, Edward A. Cassidy Co., Madison Ave. and 40th St., New York. Write for prices and literature.



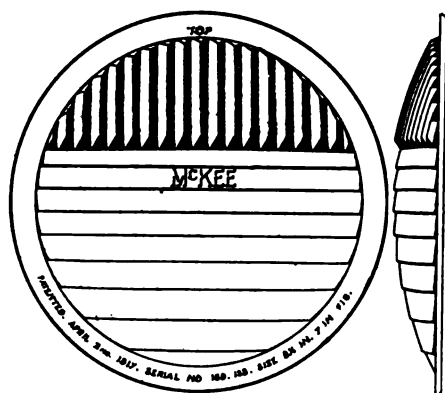
The Lennon Light Protector.

The Lennon Light, patent rights to which have been affirmed by the United States Court of Appeals, is a flexible brass reflector, heavily plated, which throws the beams of light on the road, and at an approved height from the ground, stops the glare which is prohibited by statute in many states. It is made in two sizes and will fit any headlight. The protectors are light in weight and simple in construction, having no extra springs or parts to become broken. They are attached without removing the bulb from the headlight, the operation being to place the eyelet of the protector over the tip of the bulb and pressing it into position, where it is held firmly. Those rays of light that ordinarily would be thrown outward and upward into the eyes of oncoming motorists are reversed and directed downward.

Manufactured by J. H. Faw, Inc., 37 Warren St., New York, N. Y. Retail price \$1 per pair.

The Osgood Lens is of the horizontal prism type, being of varying widths, the smaller prisms at the top making use of the lost rays of light by reflecting them to the road. The arrangement of the prisms is such as to secure an even light which normally should reach at least 450 feet ahead of the car, and spread out to a width of 40 to 50 feet at a point some 300 feet ahead of the car. The elimination of glare follows as a matter of course for the reason that the concentrated rays in the beam are held to an elevation above the ground, not exceeding that of the lamp.

Made by the Osgood Lens and Supply Co., 2007 Michigan Ave., Chicago, Ill. Write for prices and descriptive matter.



The McKee Lens.

The Holophane Headlight Lens is of unique design, having an opaque fin on its inside, just above the light bulb. The direct rays of the light are prevented from passing to the lens. Above the fin the lens is cut into horizontal prisms, which deflect the reflected light from the parabolic reflector downward, reducing the direct glare. Slightly below the center are a series of curved prisms, so arranged that all direct, as well as reflected light is thrown directly ahead within certain limits, giving a long distance beam. Between the horizontal prisms and fin and the curved portion, the lens is broken by a series of diagonal lines for the purpose of deflecting light to the sides. At the center is a bullseye refractor prism to control the direct central rays.

Made by the Holophane Glass Co., Inc., 340 Madison Ave., New York City. Write for prices.

The Macbeth-Evans Lens have their front surface divided into five horizontal prisms, each of which is inclined at an angle that was determined by experiment. This arrangement is said to direct the light below the horizontal, lighting the path of the car at the greatest distance possible, without having the glare of the lamps blind the driver of an approaching machine. A concave surface at the back of the lens results in the deflection of the rays to the sides. To eliminate any chance for rays to extend upward, the lens is fitted with a green visor, making the whole device ornamental, and, in a measure, protecting the lens from weather.

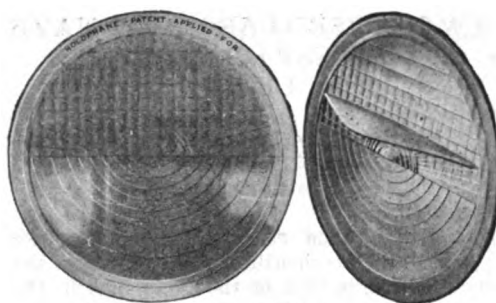
Manufactured by the Macbeth-Evans Glass Co., Pittsburgh, Pa. Write for prices and literature.

The Control-Lite Lens is a lens of the horizontal prism type and the manufacturers claim the beams to be controlled to the legal standard. It is claimed that with this form of lens the greatest beam width is nearest to the car, and that a light has a range of more than 300 feet when fitted with 21 candle power bulbs.

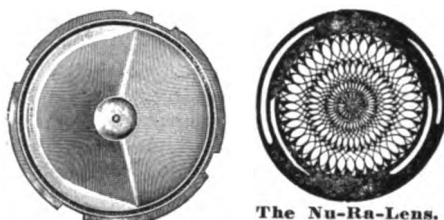
Manufactured by the Super-Lighting Co., Inc., 1934 Broadway, New York, N. Y. Write for prices and descriptive matter.

The Nu-Ra-Lens is an attractive headlight glass, which is designed to prevent direct ray action with the attendant glare. This type of lens is mosaic in effect, with its surface broken into many small prisms, which deflect the light, but do not dim it. In this way all of the light from the bulb is thrown in front of the machine, but not in the form of direct rays. The manufacturers claim that though a perfectly white and clear light is projected, it possesses none of the objectionable glare common to clear glass lenses. The illustration shows the general appearance of this lens, which is perfectly smooth upon the outside, the prismatic effect being obtained by projections upon the inside of the glass.

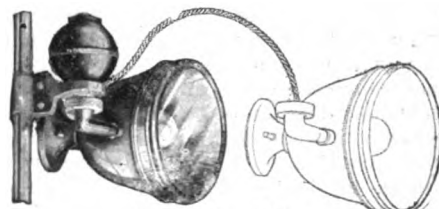
Manufactured by the Nu-Ra-Lens Co., 54 N. 4th St., Columbus, O. Prices from \$2 to \$3 according to size.



Holophane Headlight Lens.



Rand Reflector.

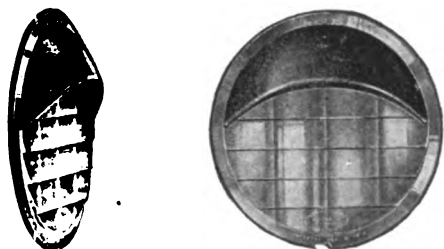


The Nu-Ra-Lens.

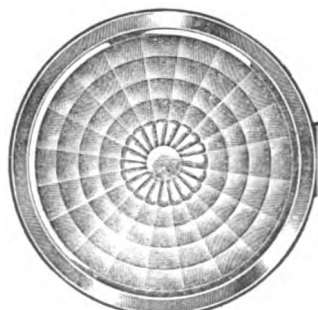
The Autoreolite.



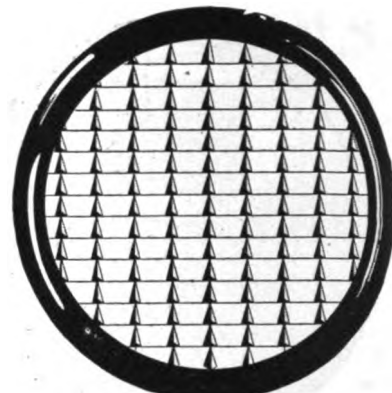
Control-Lite Lens.



The Macbeth-Evans Lens.



The More-Lite Lens.



Sun Ray-Lens of the Prismolite Co.

Rand Reflectors do not permit any of the light rays to shine above the horizontal. One portion of the light is directed straight ahead, but is never higher than the lamps. The other portion is distributed along the road. The result is a brilliant light that illuminates the road, penetrates fog and doubles the efficiency of the lamps.

Manufactured by the Rand Manufacturing Co., Inc., Haverhill, Mass. Write for prices and literature.

The Autoreolite is a spotlight, a searchlight, a flashlight and a trouble light all in one. It costs no more than the ordinary spotlight and it is moveable to any point about the car at the end of a 12-foot extension cord, that when not in use is wound on a self-contained automatic reel.

Manufactured by the Anderson Electric Specialty Co., 118-124 Clinton St., Chicago, Ill. No. 3140, model B-6 (six inch), price with rear view mirror, \$8; No. 3141, model R-7 (seven inch), with rear view mirror, \$9; without mirror deduct 50 cents.

The More-Lite Lens is composed of a number of triangular shaped prisms, radiating from a common center and separated by diagonal lines. A daisy petal design is cast at the center, which adds to the attractiveness of the lens. It is designed to diffuse the headlight beams without the blinding effect and yet illuminate sufficiently for all driving needs. This lens is made of either clear white or amber glass, highly ornamental and for practically any size of headlight.

Manufactured by L. E. Smith Glass Co., Mount Pleasant, Pa. Prices range from \$1.50 to \$2.25 for clear white lenses and from \$2 to \$2.75 for amber.

The McKee Lens is constructed on the principal of horizontal and vertical prisms, giving a direct beam of light on the road ahead, limited to 42 inches in height, and with sufficient light to the sides to illuminate the curb and passing cars. An exclusive feature of the design is that it is concave-convex. By an arrangement of vertical prisms in a sector across the top the light which is wasted in a plain glass plate, by being thrown skyward, is turned back onto the reflector and thence through the horizontal prisms.

Manufactured by the McKee Glass Co., Jeanette, Pa. Write for prices and literature.

The Sun Ray-Lens has a lens which is divided into a great number of small square prisms, designed to throw approximately 90 per cent of the light directly ahead of the car, in a line parallel with the road surface. These square prisms are separated from each other by small triangles, through which the balance of the light given by the bulb is refracted to the sides of the machine, at an angle of about 165 degrees, affording light for determining the ditch lines.

Manufactured by the Prismolite Co., 4th and Gay Sts., Columbus, O. Write for prices and literature.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

The Cellbeam Concealed Spot Lamp is a radical departure from conventional types of spot lamps in that instead of being used clamped to the windshield it is carried in the hand and attached with a clip to the dash or instrument board. The device projects a concentrated beam which extends 500 feet in a straight line and a diffused glow which illuminates nearby objects at a greater angle. It is fitted with a six volt nitrogen bulb, 30 candle power, and silvered reflectors. The exterior is finished in polished nickel and the handle is fitted with the focusing adjustment. With the device is furnished five feet of flexible cord, which is connected with the battery in the usual manner, making an excellent "trouble lamp."

Manufactured by Cellbeam Corporation, 501 Fifth Ave., New York City. Price \$5.

The Howe Searchlight Bracket, inasmuch as the idea behind the searchlight is the providing of a freely turning light, it is obvious that the bracket is of importance. One of the advantages of the Howe spotlight is its ingenious bracket arrangement. This bracket is of the universal joint type and both joints can be turned at the same time so that the lamp may be moved instantly at any angle, with but little effort. Although it may be moved easily, it is said that the lamp stays where it is directed until again moved because of the patented spring control. Two coil springs hold the two joints in a firm, even pressure, make it easy to turn, but hold it firmly wherever turned, unaffected by jars and vibrations.

Manufactured by Howe Manufacturing Co., Chicago, Ill. Write for prices and catalogue of lamps.

The Pennock Headlight Tilter is mounted upon movable pins, which are actuated by a rod connecting the two brackets. Upon this rod is fastened a long arm and to the arm a rod leads to a foot pedal. Pressure upon the foot pedal tips the lights to any angle within its range, thus removing the light rays from the air and diverting them to the road without cutting down on their brilliancy.

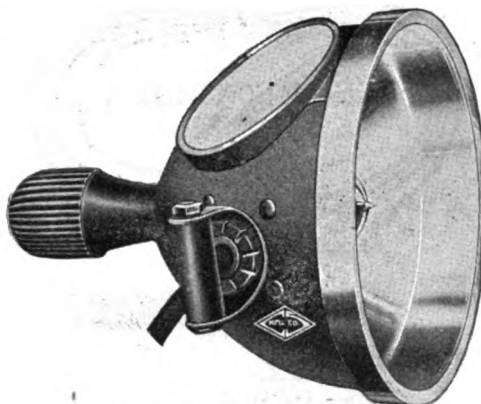
Made by the Specialty Manufacturing Co., Minerva, O. Write for prices and literature.

The Red Spot Searchlight brought out by the F. W. Wakefield Brass Co., is larger in size and of greater power than the average spotlight. It is seven inches in diameter and has a 30 candle power lamp. The operator of the car may flash either a white or red beam of light from the lamp by turning a switch, making it serviceable either as a spotlight or danger signal.

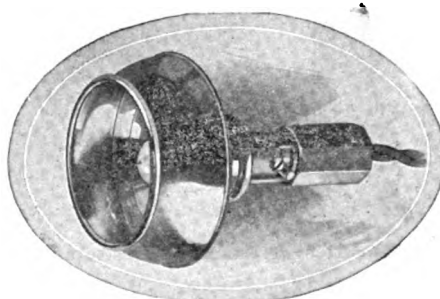
Manufactured by the F. W. Wakefield Brass Co., Vermillion, O. Write for prices.



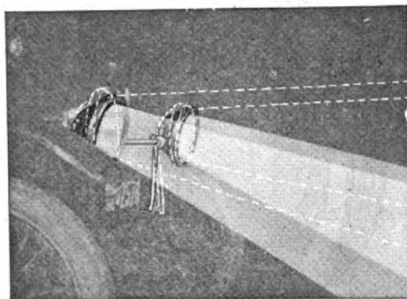
Red Spot Searchlight of Great Power with Red and White Rays.



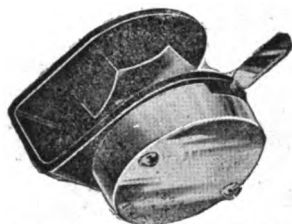
Culver-Stearns' Giant Searchlight.



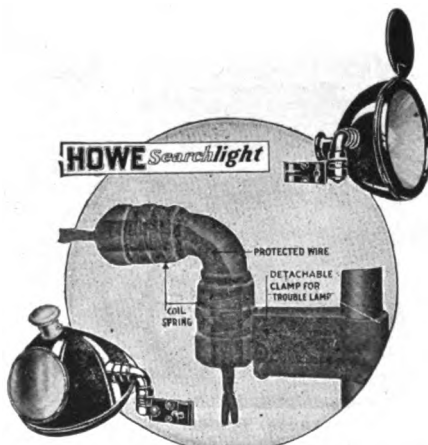
Cellbeam Concealed Spot Lamp.



Pennock Headlight Tilter.



Ford Headlight Control.



Howe Searchlight Bracket.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

The Culver-Stearns' Giant Searchlight is made of steel finished in dull black enamel and fitted with a brass, silver plated over nickel reflectors, scientifically laid out to give the best light under all conditions, and a rear view mirror if desired. When fitted with a nitrogen bulb and properly focussed, it is said to give enough light to enable one to see guide boards, numbers, etc., at practically any distance that the eye could read in daylight. The bracket is made of pressed steel and designed with a universal joint so that the light beam can be thrown in any direction. The light is controlled by a single point switch which is operated by the handle.

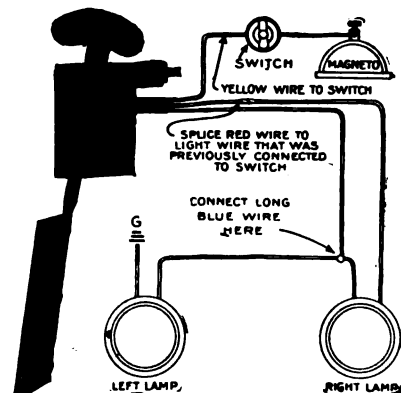
Manufactured by Culver-Stearns Manufacturing Co., Worcester, Mass. Prices upon request.

The Van Sicken Combination Headlight Dimmer and Intensifier is a simple device by which the operator is able to control the electrical current from the Ford magneto for the lighting system of the car. The system comprises two units, a resistance coil, which is placed in the lighting circuit, and a switch, which is attached to the center of the steering wheel. The illustration shows the latter. The switch bar may be placed in either of three positions: At "On" the headlights will illuminate at normal, as provided by the regular Ford equipment; at "Dim" the illumination is mellowed as for city driving; at "Con" the current is concentrated into the left headlight, resulting in an intense driving light for bad roads. The system is designed to perform the above functions irrespective of engine speeds.

Manufactured by the Van Sicken Co., Elgin, Ill. Price, \$4. Complete with diagram and instructions.

New York Automatic Head Light Controller for Ford cars eliminates trouble of varying light given by the car headlights. The Rear Light Controller consists of an arm which is attached by means of a stud to the base of the device. To the lower end of the swinging arm is attached an aluminum disc, which when in position on the engine is about eight inches back of the fan. The base is fitted with three contacts, over which the swinging arm travels. When the engine is started the arm, by spring tension, is brought to the first contact and only the left headlight receives current. The total current from the magneto is sufficient to illumine this single headlight to its full candle power. As the engine speeds up the air current, acting on the swinging arm disc, carries it to the second contact and both bulbs receive current. Should the engine speed increase still further the arm would contact with the third connection and a resistance coil introduced into the circuit, preventing the burning out of the lights from excessive current.

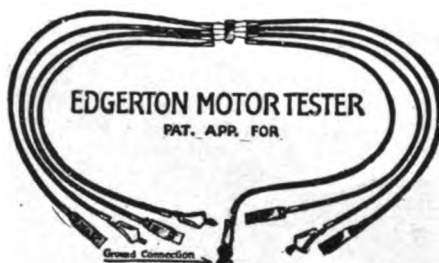
Manufactured by New York Coil Co., 338 Pearl St., New York, N. Y. Price \$5 complete with wiring.



New York Headlight Control.

The Edgerton Motor Tester is for use in determining if all the cylinders of an engine are working properly and are each furnishing an equal amount of power. It consists of a number of secondary wires which are connected by special easily attached clips with the spark plugs of all but one cylinder. Another wire from the tester is grounded to the engine base, thereby cutting out all but one cylinder. It is then an easy matter to find whether that particular cylinder is running smoothly. By altering the wire arrangement each cylinder may be tested in turn.

Manufactured by R. G. Edgerton & Co., Suffolk, Va. Prices ranging from \$2 to \$9.50 according to number of cylinders and type of tester.



The Handy Terminal is for use on practically any type of cable connection, and is connected without soldering. The ferrule is fitted to the cable and the stripped wire firmly held by a copper clip, which is claimed not to work loose. The jaws of the device are threaded on the inside and engage the threads or the spark plug center bolt. One motion raises the ring, compresses the steel spring, releases the terminal and lifts it from the bolt. There are no nuts to tighten or work loose, and its application takes but an instant.

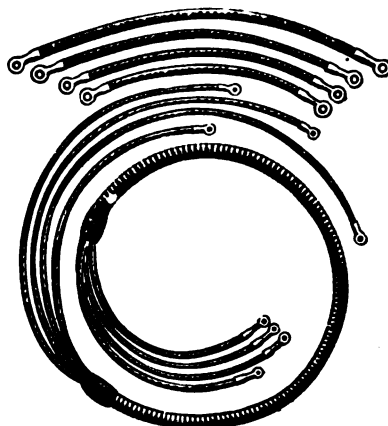
Manufactured by the Francis-Rand Co., 400-401 Erie Bldg., Cleveland, O. Price 25 cents each.



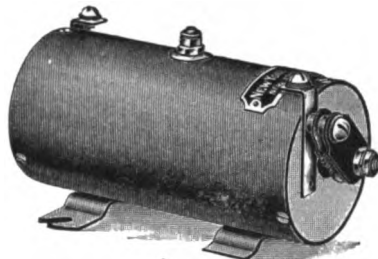
Application of the Handy Terminal.

The B.-W. Magneto Tester makes it possible to test Ford magnetos without removing the magneto from the engine and it constantly checks up and indicates any trouble. The tester consists of a reactance coil and an alternating current ammeter, all mounted in a neat wooden case. The scale of the tester is calibrated to show the proper strength of Ford magneto upon any model. The tester serves its greatest purpose when the engine is on the bench. It enables one to get the magneto perfect before reassembling the engine in the chassis. This is done by grounding one of the leads of the tester to the engine and holding the other lead to the contact of the coil frame with the fingers. The other hand revolves the fly-wheel. This can be done fast enough so that the tester will give a steady, accurate reading. Other tests can be made quickly and accurately by running the engine at any moderate speed, without disassembling, and the tester will indicate the exact condition of the magneto.

Manufactured by the Ballman-Whitten Manufacturing Co., 4440 Olive St., St. Louis, Mo. Price, \$10. Substantial discount to dealers.



Ford Ignition Outfits.



New York Transformer Coil.

The Marvel Spark Plug Intensifier overcomes ignition trouble on internal combustion engines. The spark that is produced at the point of the spark plug when the spark gap is in series with the spark plug, results in a fatter, stronger, better spark than would otherwise be produced. The spark produced with the gap permits the use of a leaner mixture, that not only saves gasoline, but also cuts down carbon deposits in the cylinders. This is because carbon comes largely from the partially burned gasoline, resulting from the use of too rich a mixture. Another advantage is that with the spark gap all plugs give the same intense spark no matter if they are old.

Marketed by Wm. Simpson, 228 S. Wells St., Chicago, Ill. Price 35 cents each. Write for literature.

The Vibrator-less Coil Ignition System for Ford cars consists of a timer distributor unit, which is designed for mounting on the front of the engine and driven from the present camshaft projection. The distributor unit is similar to the conventional high-tension distributor, while the timer, or breaker box, is so arranged that with every break in the circuit a shower of sparks is produced by the coil, which is mounted on the engine. Current for the system is taken from the Ford magneto, and such is the construction of the breaker box that the "dead" points of generation in the magneto do not effect its working. This system is said to work equally well either on dry cells or storage battery.

Manufactured by New York Coil Co., 335 Pearl St., New York, N. Y. Price complete, \$20.

The New York Transformer Coil is interchangeable with any supplied on all modern battery ignition systems. They produce a hot flame at all engine speeds on a minimum amount of battery energy. Operating on very low voltage they mean getting away from starting troubles that have been attributed in many cases to the inability of coils to supply a sufficiently powerful spark at the instant of starting, as at this time the starting motor's drain on the battery is so heavy as to reduce the voltage in many instances to four volts or less. The condenser is of the proper construction to insure long life of contact points in the distributor.

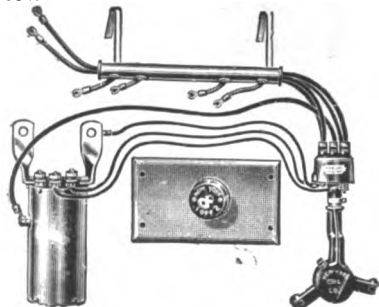
Manufactured by the New York Coil Co., New York, N. Y. List price on all models \$9 each.

Ford Ignition Outfits include a complete set of primary and secondary wiring of the highest grade wire. The cables are cut to correct lengths and finished with soldered terminals or black rubber nipples if so desired. Low tension wires protected with cable insulation are furnished where the wiring is exposed to grease or oil drippings. The wires are in contrasting colors, which make sure of proper replacement.

Manufactured by the S-E Motor Engineering Co., 14 East Jackson Boulevard, Chicago, Ill.

The Hubbell Toggle Switch is quick to work, slow to wear and drops instantly into place and will quickly break the connection with a flip of the lever. It is easily installed upon the dash and requires no complicated movement of the fingers to send it into action. With the handle up the current is on and with the handle down the current is easily detached, making the switch fool proof. All types are made, meeting the regular standard and special switch requirements.

Manufactured by the Harvey Hubbell Co., Inc., Bridgeport, Conn. Write for prices.



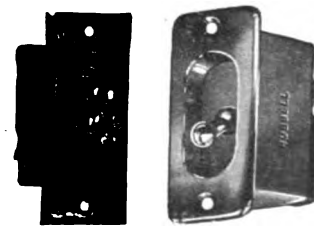
Vibrator-less Coil.



Magneto Tester.



MARVEL
SPARK-PLUG
INTENSIFIER

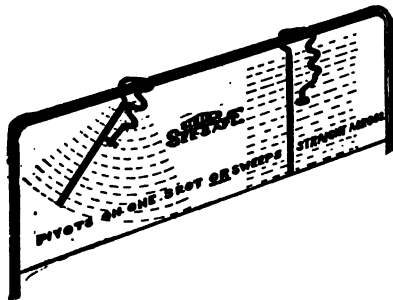


Hubbell Toggle Switch.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

The See-Safe Windshield Wiper is so arranged that it may be drawn across the windshield, cleaning a rectangular space, or pivoted upon the top and swung in a half circle, serving to clear a space or cleaning the rain, moisture or sleet away from the windshield for its full width.

Manufactured by Stader Metal Specialty Co., 19 S. 5th Ave., Chicago, Ill. Write for prices.



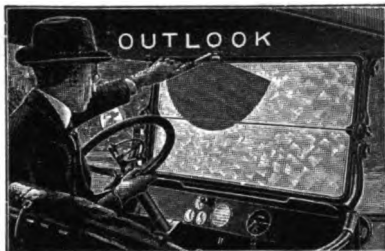
See-Safe Windshield Wiper.

The Sales Auto Glare Stopper consists of a reel which may be attached to the top of the windshield. Upon this reel is carried a strip of colored celluloid, in a similar manner to which the ordinary window curtain is carried. At night the colored celluloid strip may be pulled out and fastened to the lower part of the windshield. Thus the blinding rays of the headlights are softened by the action of the celluloid and accidents are prevented.

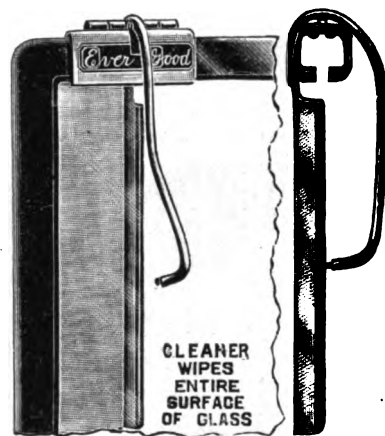
Manufactured by Sales Publicity Co., 25 Carlton Court Building, Buffalo, N. Y. Price \$1.

The Outlook Cleaner is attached to the windshield of the automobile. An adjustable wiper is held against the outside of the windshield and fastened to it is an arm which may be reached from the seat of the machine. By swinging this arm through a half circle, rain, snow or fog is automatically removed from the portion of the windshield over which the wiper passes. This device is made in two styles, one for open cars that is attached to the top of the windshield, the other for closed cars, which is attached through the glass.

Manufactured by the Outlook Co., 5518 Euclid Ave., Cleveland, O. Price \$1.50 for either style.



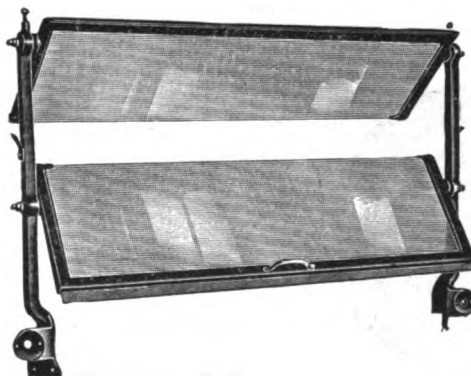
Outlook Cleaner.



Application of Windshield Cleaner.



Auto-Scope Windshield Wiper.



Motor Products Windshields.

The Ever Good Windshield Cleaner is a device which may be slipped over the top rim of the windshield. Pressing against the glass outside is a long rubber blade and as this is drawn across the panel by the operator, rain or moisture is squeezed from the glass by the pressure of the rubber. When the cleaner is drawn back the rubber blade reserves, thus making the cleaner double acting. It is made in black steel stamping with nickel finish and is inconspicuous on the shield.

Manufactured by Emil Grossman Manufacturing Corporation, Bush Terminal Factory 20, New York City. Write for prices.

The Auto-Scope Windshield Wiper cleans both sides of the glass at the same operation. The inside wiper is made of heavy absorbent felt, yet not so heavy as to cause undue friction and drag. The outside wiper is made of the best grade squeegee rubber, guaranteed not to scratch the glass. The whole device may be placed either at the top or between the glass sections of the shield, since it requires but 1/16 of an inch clearance.

It is made in three models: The Auto-Scope Junior with no rear wiping member, finished in black enamel; Auto-Scope No. 1 in oxidized finish for both front and rear of glass, and the Auto-Scope No. 2, designed similar to No. 1, but made of steel, heavily coppered and nickel plated.

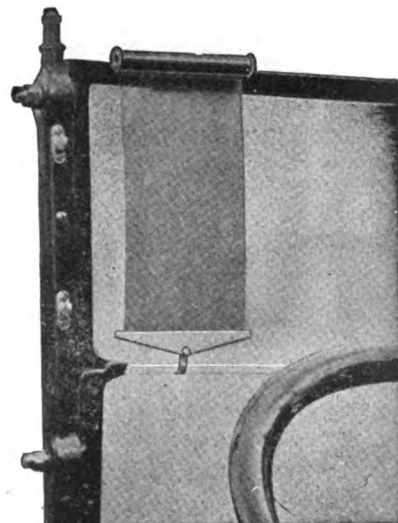
Manufactured by the White Lock Co., 1241 Michigan Ave., Chicago, Ill. Price, Junior, \$1; No. 1, \$1.50; No. 2, \$2.

The Tri-Co Rain Rubber can be easily attached and readily removed, cleaning both the top and bottom glass of the windshield the full width across. Multiple faces of gum rubber make the cleaner flexible with two cleaning surfaces on each arm. The rivets are topped with celluloid heads, so that they will not scratch the glass. One desirable feature is that the device can be removed by simply opening the glass and lifting the rain rubber off. It is made in five different models, designed to cover any type of two-piece windshield.

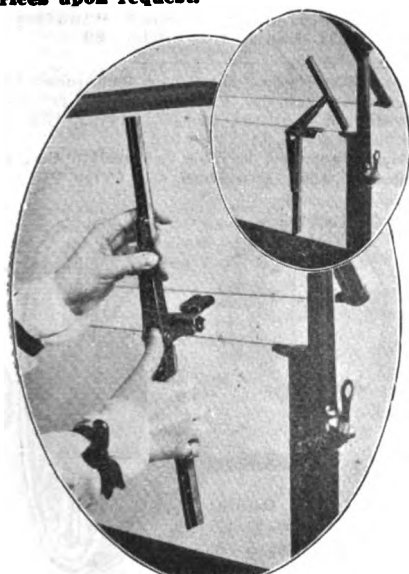
Manufactured by Tri-Continental Corp., Buffalo, N. Y. Price, \$1.50.

Martin Automobile Bucket will hold about one gallon of water, yet can be folded flat when empty and carried in the pocket. It is made of a special dull finished water proof duck and so designed that water can be poured from it into the filler of the radiator without the use of a funnel.

Manufactured by the Martin Manufacturing Co., Lancaster, O. Price 50 cents.



The Sales Auto Glare Stopper.



The Tri-Co Rain Rubber.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

A Tilting Steering Wheel for Fords which has been placed on the market by the L. P. Halladay Co., may be mounted on the steering post, replacing the regular wheel, and requires no changes but the removal of a nut and the substitution of a new spider. The device consists of a special spider having one arm hinged so as to allow uptilt of the wheel and an easy entrance to the driver's position. This wheel is made in 15 and 17-inch sizes, with a choice of plain or corrugated rims, whereas the replacement of the original rim may be made if desired.

Manufactured by the Halladay Co., Streator, Ill. Prices, 15-inch spider, \$3; 15-inch spider with rim, \$4; 17-inch spider with rim, \$5; corrugated rim, either size, \$1 extra.

The Motor Dictograph is an interesting adaptation of the famous Dictograph principle of sound transmission.

The type A style is built into the side of the car and has no moveable parts. It is operated simply by the pressure of a button and it is only necessary to speak in an ordinary tone of voice without any physical effort on the part of the passenger.

The Cabinet type Motor Dictograph is designed to be installed in any car by any service station or garage in half an hour. It is self contained in mahogany cabinet. The operation is described—"just press the button and talk."

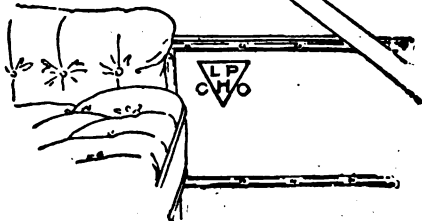
Manufactured by the General Acoustic Co., New York, N. Y. Write for prices and literature.

The Raybestos One-Piece Suits, which are guaranteed by the manufacturer to prevent all oil, dirt or grease from soiling the clothes of the wearer, are being furnished at cost prices by this concern. These suits are well made of heavy fabric in choice of three weights at different prices, and have Raybestos advertising name printed across them. For the garage men who sell this product it affords good advertising; for the machine owner, such advertising matter is not objectionable, as he is able to get a good suit at an extremely low price.

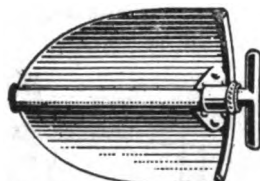
For further details and prices write to the Raybestos Co., Bridgeport, Conn.

The Ideal Tourist Shovel is made with a telescoping handle, adjustable so as to permit a short or "half handle," a full length handle or handle telescoped into the hollow part of the blade, thus giving a shovel that can be placed in the tool box of any car. The blade is made of high carbon steel—6"x8½", the handle length being 16 inches and the weight two pounds. It is handsomely finished in nickel plate.

Manufactured by the Ideal Manufacturing Co., Kansas City, Mo. Write for prices and literature.



Tilting Steering Wheel Gives Extra Room for Admittance to Operator's Seat.



Ideal Tourist Shovel.



Raybestos

H-S "Minute" Demountable Wheels are made for Ford cars. The tire can be shifted in 60 seconds by simply removing one large nut. The outfit consists of four Minute Hubs with one extra wheel, interchangeable with any of the four. The change can be made with little effort without soiling hands or clothes. They have less weight than demountable rims and a better balance, for the bulk of the weight is at the hub instead of the rim. Four Minute Hubs, an extra wheel, a wrench and one extra flange accompany the outfit.

Manufactured by the Hill-Smith Metal Goods Co., Boston, Mass. Price, \$30. Denver and the West, \$35.

The New Handy Push Button is an improvement over the Handy Push Button and Holder, which the makers claim, was one of the most popular push buttons ever sold for Fords. This new button does away with the holder, its base fitting over the Ford steering wheel post. It mounts on the top of the steering wheel column in the centre of the wheel and besides being the last word in efficiency and convenience, it is strong, durable and good looking. Though it is made for Ford cars, a slight change in wiring makes it adaptable for the Chevrolet, Dodge and Maxwell cars.

Manufactured by the Francis-Rand Co., Cleveland, O. Price 50 cents.

The Cuno Auto Cigar Lighter is simple, efficient and reliable. The burner tip is made of heavy wire and will last indefinitely. It is equipped with six foot cord that automatically rewinds after being pulled out for use. It is finished in nickel and mounted upon the dash by drilling a hole 25/32 of an inch in diameter and inserting the neck from the rear of the dash and tightening nut. A resistance coil is furnished for use with cigar lighter for cars having either 12, 18 or 24-volt batteries.

Manufactured by the Cuno Engineering Corporation, Meriden, Conn. Write for prices.

The Shurnuff Combination Manifold, as the name indicates, is a single casting, which comprises both the intake and the exhaust passages. By this method the incoming gas is heated by contact with the exhaust manifold walls, being vaporized by the extreme heat, and thus having a tendency to be more explosive when in the cylinders. Through the casting are holes which fit over the standard Ford studs, so that no alterations to the engine are required. The manufacturers claim a saving in fuel, as well as a smoother running engine with this installation.

Manufactured by Shurnuff Manufacturing Co., St. Louis, Mo. Price, \$9.

The Whirlyflag Radiator Ornament is a durable patriotic insignia which revolves rapidly in a slight breeze, giving the appearance of a flag waving.

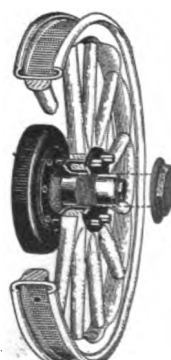
Manufactured by the Prismolite Co., 4th and Gay Sts., Columbus, O. Price \$1.



Cuno Cigar Lighter.

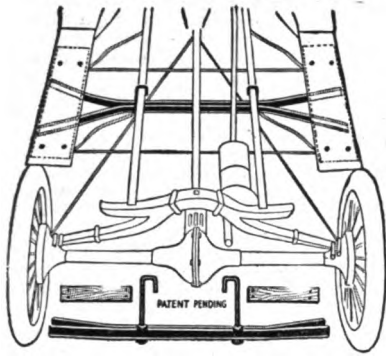


Whirlyflag Radiator Ornament.



Minute Demountable Wheel.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

**Presto Body Brace.**

The Presto Body Brace is designed to support the running boards on the Ford car. It is made up of two pieces of channel iron placed back to back, securely riveted together with a spacer between them. The channel irons are separated slightly by the spacer, which allows room for two bolts, which are formed into a hook at the top. These are hooked over the main frame work of the Ford chassis and the ends of the channel iron project out on either side under the running boards. Two extra pieces of board are furnished, which fit underneath the running boards for a distance of about 36 inches and when the nuts on the bolts which hook over the frame are tightened this body brace forms a perfect support for the running boards and binds the frame work and body of the car together, thus stopping vibration.

Manufactured by the Metal Specialties Manufacturing Co., Chicago, Ill.

The Leb-Iron Traffic Sign is so constructed that it will withstand a large amount of hard usage. It is provided with a seven-inch red or green globe, as shown in cut, with an electrical lamp socket and wire connections already for use. It may be connected beneath the pavement or from overhead, and is sufficiently prominent to cause any car driver to take immediate notice of it. It is approximately six feet in height and the letters are raised one-half inch above the background and covered with white enamel, the background with red or green smalts. The rest of the sign is finished in black enamel.

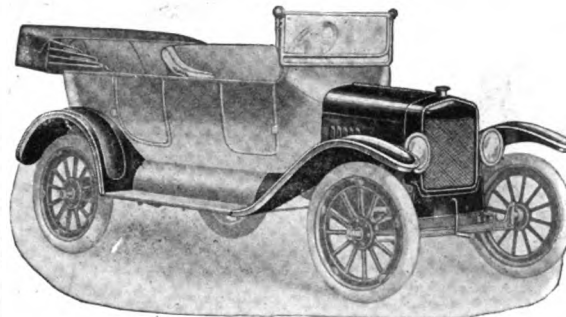
Manufactured by the Lebanon Machine Co., Lebanon, N. H. Price with electric light and globe, \$20; plain provision being made for attaching lantern, \$16.

A Double Outlet Y Plug Socket has recently been placed upon the market. Unlike the straight plug socket this plug is made in the Y shape, converting a single outlet into a double socket. By its use the owner converts his single dash lamp for two purposes at the same time, for one side of the plug may be used for spot light and the other side for an inspection lamp, regular dash lamp or cigar lighter. It has a standard Edison type plug connection at one end, which can be plunged into any dash lamp socket and is neat appearing with the exposed parts nickel plated. It is made in double contact, single or double to single contact.

Manufactured by the Metal Specialties Manufacturing Co., Chicago, Ill. Write for prices.

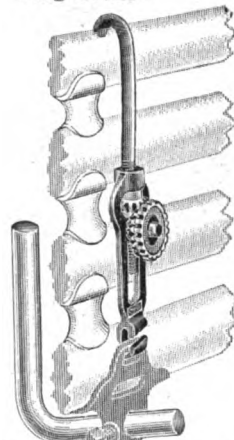
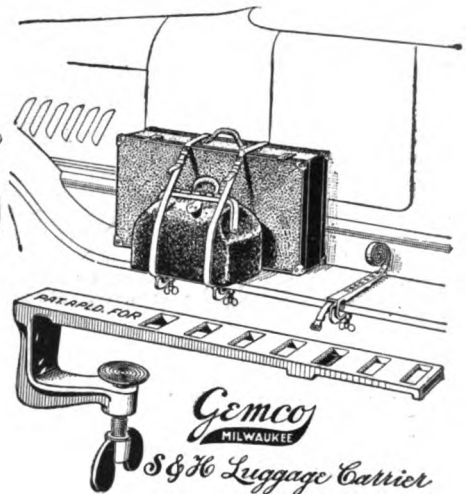
The Presto Pipe and Cigar Lighter is so conveniently arranged that when the motorist wishes to light his cigar or pipe he simply reaches for the lighter, takes it from the holder, presses the button and a light is immediately available, wind or weather making no difference to the action. The lighter is equipped with six feet of cord and designed for connection with the storage battery. The cord is automatically reeled up when not in use upon a special winder by spring tension.

Manufactured by the Metal Specialties Manufacturing Co., 338-352 North Kedzie Ave., Chicago, Ill. Price complete with winder, \$4.00; without winder, \$1.50.

**Corcoran Crown Fenders.****THE FRIESTEDT HYDRONIZER**

REMOVE YOUR INTAKE AND REPLACE WITH HYDRONIZER IN LESS THAN FIVE MINUTES.
NOTHING TO FIT
NO HOLES TO DRILL
NOR TAP
MORE MILES, NO CARBON AND CLEAN PLUGS GUARANTEED.

PATENT APPLIED FOR

**Double Outlet Y Plug Socket.****Mosco Bow Clamp.****Leb-Iron Traffic Sign.**

The Corcoran Crown Fenders are made to fit all models of Ford cars and are of No. 20 gauge steel, finished with two coats of black enamel, baked on, and their attachment adds materially to the appearance of a Ford. The fenders are packed one set in a crate, which prevents them from being scratched or damaged through handling. No. 16 fenders fit 1909-1916 cars. No. 17 fenders fit 1917 and 1918 cars.

Manufactured by the Corcoran Manufacturing Co., Cincinnati, O. Write for prices and literature.

The Gemco Luggage Carrier has clamps that are secured to the running board with thumb screws. The clamps have slots in the top arm so that straps can be run through the hollow arm and out from any of the holes to be buckled around the luggage.

Manufactured by the Gemco Manufacturing Co., Milwaukee, Wis. Set of two carriers and straps, \$2.50.

The Friestedt Hydronizer operates automatically from the moment the engine is started until it is stopped. Air is drawn in through the top of the device and thence through the water in the reservoir. In passing through the liquid the air is saturated with water and is drawn into the engine through the manifold connection in the form of water vapor. There are two models, the Ford and Standard, the latter being applicable to all other cars.

Manufactured by Friestedt Manufacturing Co., 2934-38 W. Lake St., Chicago, Ill. Price complete, as illustrated, \$7.50. Thirty days trial. Attractive proposition for agents.

The Mosco Ford Top Bow Clamp hooks on to the bow brace and over the top of the bows when they are folded back. By means of a small hand wheel the tension on the bows may be increased and the bows held rigidly into place. The manufacturers claim that no amount of shaking will force the holder from its grip, neither will it slip nor mar the finish of the bows.

Manufactured by Motor Specialties Co., Waltham, Mass. Write for prices and catalogue.

The Triumph Magnetic Gauge is an indicator that may be applied to any shape tank, either portable or stationary. A hollow metal float is threaded upon a gunmetal bronze ribbon, which is suspended from the top of the tube, and to which a permanent magnet is attached. The bronze ribbon passes through a tube in the centre of the float. As the float travels up and down inside the tube of the gauge with the rise and fall of the fluid in the tank, it is turned by the spiral cut in the tube.

Manufactured by Boston Auto Gauge Co., 8 Waltham St., Boston, Mass. When writing for quotations give dimensions of tank.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

The Long Horn shown in the cut is both ornamental and durable. The contact between the diaphragm and the rotor is made by steel rollers inserted in the rotor, which is of hardened steel. Their action on the diaphragm gives a rolling tone peculiar to the Long horn. The volume of sound may be varied from a long, low rumble to a loud, sonorous crash, and continues after power impulses have ceased. It is finished in three styles: All black, black and nickel and black and brass. Total length, nine inches. Length of bell, 6 $\frac{1}{4}$ inches.

Made by Edward A. Cassidy Co., Inc., 230 Madison Ave., New York City. Model 3, \$3.

The Fanhorn, a warning signal, is different from every other warning device, as it emits tones, the volume and penetration of which is in direct proportion to car speed. This result is achieved by the simple expedient of making the Fanhorn a part of the engine fan, in fact, the entire device is merely substituted for the present fan on any car, with no alterations. The tone of the Fanhorn is described as a cross between a whistle and a whoop, both pleasing, as well as commanding, and the pitch changes with the engine or car speed.

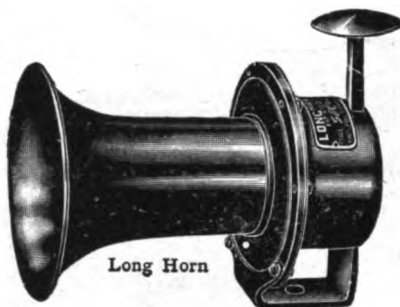
Manufactured by the Art Metal Manufacturing Co., Cleveland, O. Write for prices.

The Buell Explosion Whistle gives a distinctive warning signal. As the name implies this device is operated by the pressure caused by the explosion in the engine. Mechanically it consists of a fitting which may be screwed into the engine in place of the priming cup and in which is fitted a small poppet of $\frac{1}{4}$ inch in diameter. The valve is opened by a control cord, which may be fastened to the steering column, allowing a small amount of gas to pass through it and operate the whistle. The makers sell the device under a 10 year guarantee and claim that under ordinary conditions it will last longer than the car itself. The warning is said to be distinctive enough to command instant attention even above all other traffic noises.

Manufactured by Buell Co., 1610 S. Michigan Ave., Chicago, Ill. Price for single tone with valve, \$4.25; chime model with valve, \$6. Special plug without whistle for Ford car attachment, \$1.25. Whistle extra as above.

The Liberty Siren is said to possess unusual merit and is meeting with popularity. One of its big features is that it warns without frightening people. It has a range of two octaves—singing like a mocking bird—and playing many different tone combinations, conforming with all city ordinances. It fits all cars and is easily attached to the exhaust manifold, using exhaust gas and controlled from the dash or steering wheel. It is self-cleaning and is practically indestructible.

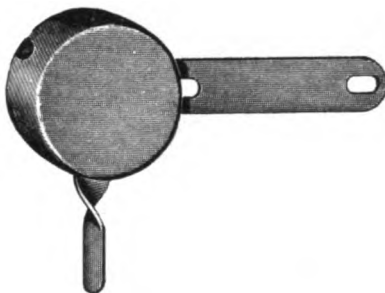
Manufactured by the Liberty Accessories Corp., St. Louis, Mo. Price complete with instructions, \$3.50.



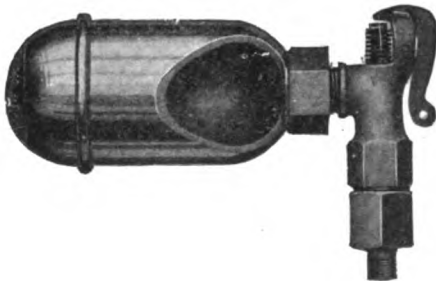
Long Horn



The Fanhorn.



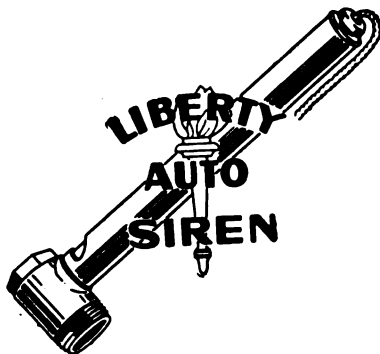
The Fordimmer and Fordalarm.



Buell Explosion Whistle.



The G. A. C. Accelerator Foot Rest.



The Liberty Siren.



The Liberty Bell.

The Fordimmer and Fordalarm are two new Ford car accessories. The headlights may be dimmed at will by the driver with the Fordimmer, thus preventing headlight glare. It is also a safety device in that the lights are kept from burning out at high engine speed. It is claimed that the voltage is regulated and that the ignition system is not affected by this use.

The Fordalarm operates by a button mounted just beneath the steering wheel, on the end of the gasoline control lever. In emergencies the driver's hand is usually on this lever, and the second finger of the hand is always in position to press the alarm button if necessary and sound the horn.

Manufactured by Detroit Novelty Manufacturing Co., Marquette Bldg., Detroit, Mich. Price of Fordimmer, \$1.50. Fordalarm, \$1.

The E. A. Laboratories, Inc., manufacture an interesting line of E. A. Newtone Handphone hand operated and electrical motor driven horns and claim that expert designing and manufacturing directions, coupled with years of uninterrupted experience, enable them to put out a serviceable article at a low price. They produce horns in large quantities and of practically any size and description, whether motor driven or hand operated.

Manufactured by E. A. Laboratories, Inc., Broadway and Wythe Ave., Brooklyn, N. Y. Prices upon application.

The Liberty Bell is somewhat different from the usual type of signal. It is said that the tone is distinctive, unmistakable, yet musical warning, which does not offend. At the same time the signal sounds a brilliant red light is flashed through the lens surmounting the bell. By this means the warning is conveyed to both the eye and the ear.

Manufactured by the Liberty Bell Co., Cleveland, O. Write for prices and literature.

The G. A. C. Accelerator Foot Rest relieves the foot and leg strain by carrying the weight of the foot in a specially designed rest, which is so arranged that the accelerator pedal may be held in practically any position with a minimum amount of effort. With this device, which is ornamental in effect, unsightly holes in the car matting, as well as shoe wear, is prevented.

Manufactured by the General Appliance Co., 127 Federal St., Boston, Mass. Price, \$1.50.

AC Spark Plug Display Stand is 20 inches wide by 39 inches high and has space for 500 plugs. It is substantially made and has an attractive light oak finish. Any dealer desiring further particulars and special proposition is requested to write the makers.

Manufactured by the Champion Ignition Co., Flint, Mich.

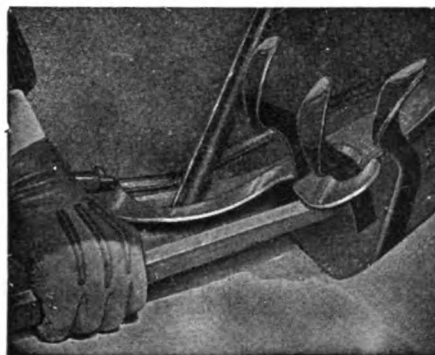
(When Writing to Advertisers, Please Mention The Automobile Journal.)



Switch Lock.



Syracuse Ford Lock.



The Essansee Lock.



Goodrich Steering Column Lock.

The Security Switch Lock for Fords consists of a strong alloy metal housing that covers the Ford switch. The housing is secured by removing the name plate or the complete metal housing of the old switch and fastening the device over the present switch and securing it with three screws. At the first turn of the key a cam forces out a pair of metal bars, which operate in slots on the inside of the switch. These bars completely cover the screw heads, thus making it impossible to remove the screws. These bars do not operate at each turn of the switch. A bronze contact spring is secured to the cam and when the key is removed this spring makes contact with the central member of the switch, which absolutely grounds on short circuits the four coils, making it impossible to wire around or make an internal connection to operate the ignition system, even in the event of a separate battery being employed. This method does not interfere with the use of a reserve battery or the magneto current. A non-pickable lock is used and two keys supplied, as well as all screws and fittings and the installation can be made, it is claimed, in less than five minutes, using a screw driver only. This device is finished in enamel and nickel.

Manufactured by the New York Coil Co., 338 Pearl St., New York City, N. Y. Price, \$3.25.

The Utility Auto Lock, which may be used in many places on a car, consists of two pressed steel jaws, which are adjustable within a small radius, fitted with teeth on their ends and so arranged that they may be brought together if necessary. The action of the jaws is controlled by a unique locking device that is unlocked by a special key. This device may be used to lock the spark and throttle rods to the quadrant, for locking robes to the robe rail, for locking pockets together and many other uses.

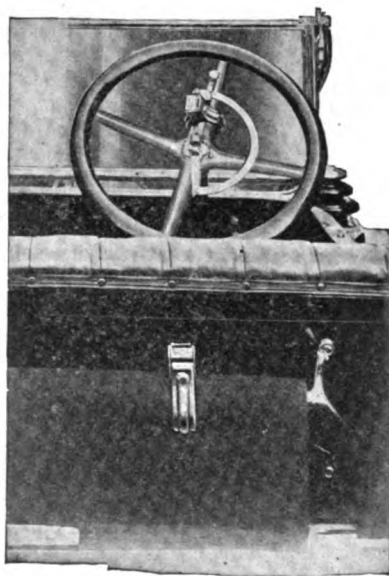
Manufactured by the Backus Novelty Co., Smethport, Pa. Write for prices and catalogue.

The Goodrich Steering Column Lock has the appearance, when locked, of being a single metal connection between the steering column and wheel, no bolts or screws exposed and the construction is so strong and rugged as to defy attempts to pry or cut it off. The cylinder used is built by Yale, which means that there are no duplicate keys. It is installed quickly by means of four screws—the heads of which are completely enclosed when the device is locked. A single turn of the key locks the steering column. The car cannot be driven for the lock holds the front wheels in a straight line. It can be pushed a short distance back or forward in a straight line, but the car cannot be driven or towed away. The lock is made of aluminum, highly polished and finished. When not in use the connecting arm and lock can be removed and dropped in the car pocket if so desired.

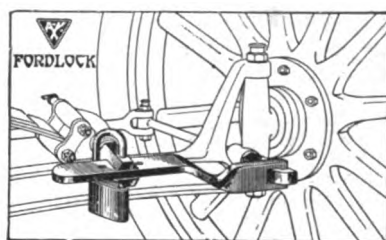
Manufactured by the Goodrich-Lenhardt Manufacturing Co., Widener Bldg., Philadelphia, Pa. Price for Fords, \$7.35; other cars, \$9.25.



Waltham Model O Truck Clock.



Utility Auto Lock.



The A-Y Fordlock.

The Syracuse Ford Lock has a novel feature in that with the lock at "off" the common contact strip, through which the current must pass in order to get into the coils, is grounded. This, the manufacturers claim, absolutely prevents getting a spark to the spark plugs by rewiring, installing a separate battery, or by any other means without a key.

Another novel feature is the method of connecting the coil box with the steering wheel column in forming the "ground." This is done by the ground plate which, after removing the nuts, is slipped over the two which fasten the coil box and steering column to the dash. When the nuts are again screwed on the bolts they force the turned up portions of the plate into the threads of the bolts, making a permanent ground between the coil box and the car frame. The common contact strip is grounded to the coil box only when the car is locked.

The exposed coil box wires are absolutely guarded by a "protector," which while it cannot be removed without taking off the lock, allows the coils to be removed at will for filing, etc.

Manufactured by Syracuse Universal Manufacturing Co., 325 West Fayette St., Syracuse, N. Y. Price \$2.50.

The Essansee Lock for the Ford car consists of an S shaped steel fitting, which is placed around the high speed clutch pedal and against the reverse pedal, holding the reverse and high gears in and making the removal of the car practically impossible. The device is locked into place back of the emergency brake lever. It is as strongly made as are the pedals, so that even if a crow bar were used to pry the device from its place the pedals would be broken before the lock.

Manufactured by Essansee Lock Co., Land Title Bldg., Philadelphia, Pa. Write for prices.

The A-Y Fordlock is applied to the steering spindle and the front axle of the car and when locked into place keeps the wheels in one of three positions. Straight ahead as shown in the cut, at the left or at the right. The locking rod is made of heavy steel; the padlock of standard design. Though it would be nearly impossible and very impractical to tow the car any distance without removing the lock, it could easily be moved in case of fire, or to relieve traffic congestion.

Manufactured by Angsten-Koch Co., Princeton Ave., Chicago, Ill. Price complete with Corbin lock, \$3.50.

The Waltham Model O Truck Clock is specified by the United States government to run war trucks on schedule time. This clock will keep accurate time all of the time because it is built to withstand climatic conditions and the shock of travel over rough roads. It has two main springs and the radium dial and hands are plainly visible on the darkest night. It is wound only once in eight days at the flash of a red signal on the dial. The United States government, who recently purchased 10,000 trucks for military purposes, specified that they must be equipped with this model clock.

Manufactured by the Waltham Watch Co., Waltham, Mass. Write for prices and literature.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Supplies and Parts Section



The A. C. Carbon Proof Spark Plug is a new type of this famous make of plugs and a sectional view is reproduced herewith. This plug was designed primarily to overcome the carbonizing trouble experienced in a certain tractor engine using kerosene as a fuel. The results were so satisfactory that it was decided to put the plug on the market for use in automobile engines. It is made in sizes for the Ford, Overland and Studebaker cars, and in tests on Ford cars covering a period of one year the manufacturers claim that no instance has been found where a plug was removed on account of carbonizing. The porcelain is provided with a number of ribs, having saw tooth edges which attain a sufficiently high degree of heat to burn away the carbon, thereby keeping the edges free from deposits and eliminating any chances of possible short circuit.

Manufactured by the Champion Ignition Co., Flint, Mich. Write for prices.

The Vitristone Priming Plug may be applied to practically any engine which is not equipped with priming cups and consists of a combination spark plug and priming cup. The design and construction are such that by injecting gasoline into the priming cup the gasoline flows directly to the firing points. The priming cup feature makes the plug self cleaning, in that the engine may be run on the other cylinders, while each cup is opened in succession, thereby forcing out the carbon and cleaning the points.

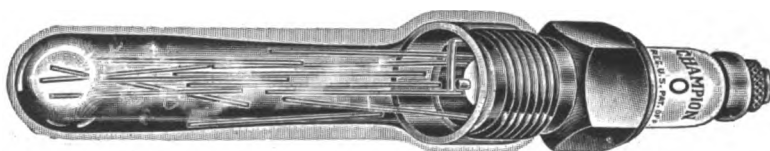
Manufactured by Emil Grossman Manufacturing Corporation, No. 20 Bush Terminal Bldg., Brooklyn, N. Y. Price \$1.50.

The Champion Spark Plug Cleaner consists of a glass tube containing 50 loose, hardened steel needles. One end of the tube is open and fitted with a rubber bushing into which a spark plug can be screwed in exactly the same manner as it fits into the cylinder head of the engine. The tube is half filled with gasoline, the plug screwed into the bushing, then the whole is shaken vigorously for a minute or two and the plug is cleaned as thoroughly as if it were disassembled and cleaned. When the tube is shaken it starts the needles in motion and they peck away at the inner surface of the plug where the carbon has accumulated.

Manufactured by the Champion Spark Plug Co. of Toledo, O. Write for prices.

The Hers Spark Plug has a mineralized mica core, which the makers claim is absolutely oil proof. This core is a built up system of mica washers around a tightly wound tube of ruby mica, highly compressed into practically one solid mica unit, which is impervious to oil, heat and moisture.

Pro-Mo-Tor Fabricating Corp., 245 West 55th St., New York, N. Y. Price \$1.50 each.



Champion "Minute" Spark Plug Cleaner.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

SPARK PLUGS ARE THE HEART OF THE ENGINE.

Must Be of First Grade and Kept Working at Maximum Efficiency for Best Results.

Most spark plug troubles are attributable to the fouling of the contact points, which is due to the excessive collection of carbon on the points, which impedes the perfect firing of the plug or stops it entirely. Plugs have been so highly standardized, as to sizes for all motors and advantages in construction, that there are a great number of makes that are recognized as highly efficient and durable. There are some plugs on the market, for which their manufacturers claim special advantages as to durability and efficiency.

Here are important points to consider in the use and selection of spark plugs: The plug must be perfectly gas tight. To test a plug for gas leakage around the porcelain at the top of bushing or below the bushing where it is screwed into the shell of the plug, squirt gasoline at these points when engine is running. If the gasoline bubbles the plug is not gas tight. The proper adjustment of the plug gap is important. A leading authority recommends the distance between the firing points as 1/32 of an inch for coil ignition and 1/64 of an inch for magneto ignition. This distance is usually ascertained by inserting a piece of ordinary thickness of cardboard between the points, which should measure nearly accurately the proper distance of the gap. All spark plug manufacturers have thoroughly standardized the sizes of their plugs to fit nearly every engine built, with special types, such as a long shank plug for motors with a deeper combustion chamber. Caution should be exercised against buying plugs too short or too long.

Mica is the best non-conductor of electric current and sustains the most intense heat without cracking. Since the war it has been very hard to obtain, as most of the supply is imported; therefore, the supply of mica shelled spark plugs is limited. Porcelain is the most generally used material for the shells of the great majority of plugs. It is a non-conductor, although it is subject to being broken by the slipping of a wrench in tightening or loosening, and occasionally it will crack under intense heat. Porcelain shells are easily replaced with new ones at a very small cost.



Master Calorite Spark Plugs involve the discovery of the new insulating material known as Calorite, and its adoption in the Master plug, the makers claim, has revolutionized the spark plug industry. This substance subjected to severe electrical tests in competition with porcelain, as an insulating material, withstood a 10 per cent. higher voltage than the finest porcelain obtainable. Every Master Plug is wrapped in felt and packed in a round metal box that may be carried in the tool box, without fear of breakage.

Manufactured by the Hartford Machine Screw Co., Hartford, Conn. Write for prices and literature.

The Push Clean Spark Plug is an innovation in spark plug design and consists of a conventional base, porcelain and centre electrodes. The feature is the movable centre electrode, which is so constructed that by pressure upon the insulated top it may be pressed down, scraping away the carbon from the inside of the porcelain, as well as from the spark gap. Two seconds time will suffice to clean all four plugs, as there is no necessity for their removal from the engine. The illustration gives a clear idea of the construction.

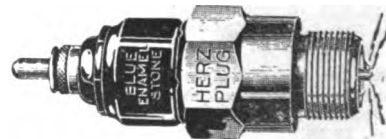
Manufactured by Wellman-Howe Manufacturing Co., 21 E. Van Buren St., Chicago, Ill. Price \$2.

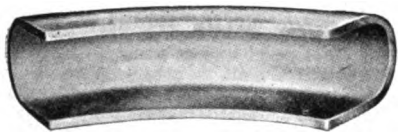
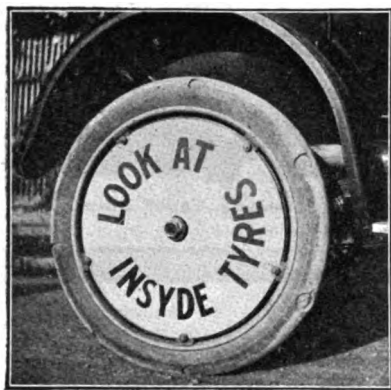


Push Clean Spark Plug.

The Perkins Spark Plug Tester is made for the purpose of locating faulty ignition plugs and for setting the spark gaps in all plugs so that they will be in "tune." The tester is made in two colors, black and red, neatly finished of high grade insulated composition. Using this device assures one of maximum efficiency of the spark plugs.

Manufactured by A. D. Perkins, 1777 Broadway, New York, N. Y. Price 75 cents.





Solid Reducing Shell.

Insyde Tyres are known as "inner armor" for automobile tires. In a rather unusual test recently an old casing which was practically worthless was obtained and seven holes $1\frac{1}{2}$ inches in diameter were cut through it. An Insyde Tyre was inserted with the usual inner tube. After this assembly was replaced upon the wheel it was driven over 2500 miles, thereby winning a wager for its owner, whose faith in this tire is strong. Insyde Tyres are more than ordinary reliners and very good results may be obtained with them from worn casings.

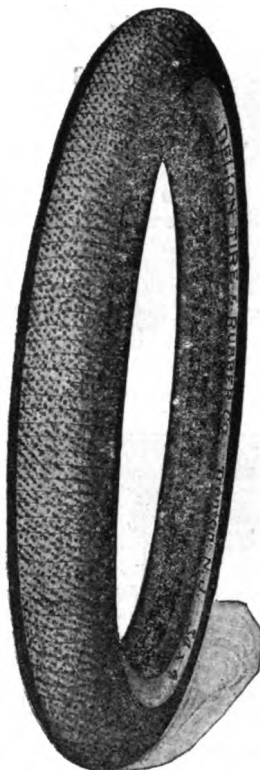
Manufactured by the American Automobile Accessories Co., 1617 Blue Rock St., Cincinnati, O. Write for prices and literature.

Delion Cord Tread Tires are a new kind of pneumatic tire which is guaranteed to be permanently non-skid and adjustable on the basis of 7500 miles of service, tread being composed of a combination of rubber stock and fabric, with the fabric standing on edge so as to come constantly in contact with the road surface. This feature gives the tire its non-skid qualities. The tread construction of the tire is entirely different from any other, for the fabric is impregnated with rubber under a new process by which the rubber is drawn into the fabric by suction instead of forced in by pressure. Thus the bond between the rubber and fabric is claimed to be much closer than by the other process.

Manufactured by the Delion Tire and Rubber Co., Trenton, N. J. Harry M. O'Brien, New England distributor, 245 Columbus Ave., Boston. Write for prices and literature.

The Kahn Automatic Valve, which is standard equipment with Armstrong tubes, is similar in outside size and shape to other tube valves. It is the internal construction that differs. Beneath the knurled collar indicated by the arrow at the top of the illustration is a graduated dial marked with five figures, 50, 60, 70, 80 and 92 pounds. The knurled collar is turned until a certain projection on its face fits into the slot above the figure indicated the pressure desired in the tube. An air supply is connected with the valve by the usual method. When the pressure in the tire reaches the desired figure the valve automatically closes and the air from the pump passes through a by-pass to the outside with a loud, whistling noise, thus giving warning that the tire has the desired pressure. The manufacturers claim that it is impossible to put more air into the tire after the pressure at which the valve is set for is reached.

Manufactured by the Armstrong Rubber Co., Inc., 118 Adams St., Newark, N. J. Prices upon request.



Delion Cord Tread Tires.



Kahn Automatic Valve.

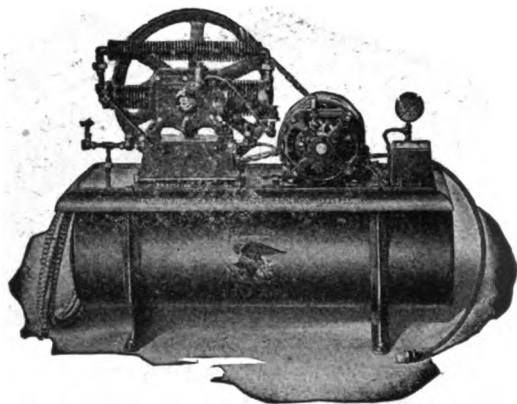


The Ever Last Resole.



Hoosier Patch Outfit.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



The De Luxe H 34 U. S. two-stage automatic air compressor has many exclusive features that make it an efficient and complete air plant. The air is drawn into a large area cylinder through a special intake silencer device and is compressed to 40 pounds, after which it is delivered to a smaller diameter high pressure cylinder through an air cooled pipe leading from the head of the smaller. The air is forced by a smaller piston through a special check valve to a filtering trap, where foreign matter and oil is removed, and thence through an automatic adjustable safety valve to the storage tank. Pressure control is by automatic valve, which stops the engine when a predetermined pressure is reached falls below a given mark. The cylinders and crank case of the compressor are cast en block and the whole apparatus is driven by an electric motor that is mounted on a plate.

Manufactured by the United States Air Compressor Co., Cleveland, O. Prices furnished on application.

The Williams Solid Reducing Shell enables the repair man to use larger sectional molds for vulcanizing repairs on small casings, whenever the small molds are busy.

By fitting a shell into a large mold the shells are machine finished to a minute degree of accuracy and are in perfect contact at all points, and as good a cure is secured as by direct contact of tire with mold.

These shells enable the repair man who has various sizes of molds to double the amount of vulcanizing on small size tires.

Manufactured by the Williams Foundry and Machine Co., Akron, O. Write for prices and literature.

The Hoosier Patch Outfit is designed for quick repair work without the use of heat or gasoline, and the manufacturers claim that a repair made with this patch is practically permanent. They claim that the vulcanizing operation is accomplished by the heat arising from the friction of the tire when in use. With the outfit illustrated is included one patch, together with sandpaper and patch solution in a self-sealing tube.

Manufactured by Hoosier Rubber Manufacturing Co., Inc., Starks Bldg., Louisville, Ky. Price of outfit No. 1, \$1.75; outfit No. 2, \$1.

The Ever Last Resole is in fact a complete new tire without beads, and is applied over the old casing. It extends clear down over the beads and when applied to the rim it cannot be distinguished from a new tire. It is not a "sewed on" or "double tread," but is built right on over the old casing, and becomes an integral part of it. It can be successfully attached by any repairman or vulcanizer. It is made exactly like a new tire of three plies of close woven $21\frac{1}{2}$ ounce long staple cotton fabric. Each ply is treated with a heavy coat of pure rubber and the tread stock is built over this fabric body.

Manufactured by the Ever Last Tread Co., Inc., Indianapolis, Ind. Write for prices and literature.



Complete Set of Cork Insert Transmission Lining with Fastenings for Ford Car.

Cork Insert Linings were originated to make the planetary transmission easier of operation and more efficient through the elimination of slipping and in addition it also has been found to give many times the service life due to the gripping and wearing qualities of the cork inserts. In the higher grades of transmission fabrics, buttons of cork are inserted at regular intervals. The corks are slightly thicker than the fabric itself and, therefore, make the first contact with the transmission drums. Because of the high coefficient of the friction of cork and steel the response to the pressure of the brake or speed pedal is immediate and a smooth, velvety stop or start is made.

Cork Insert Linings are manufactured by the Advance Automobile Corporation of 56 East Randolph St., Chicago, Ill., and retail at \$3 per set of three.

The Sprague Worm Steering Gear for Ford cars appeals to Ford users because of the safety it adds to the handling of this machine. It replaces the ordinary Ford steering equipment and with this steering gear the driver can safely steer out of ruts, hold the Ford much steadier in mud or sand and he need not worry lest a bump or other bad place in the road will cramp a wheel and upset the car. It holds the Ford to the road just as the worm steering gears hold the larger cars. It also prevents locking over centre. The makers guarantee to refund the price if the gear does not satisfy and dealers may sell under this guarantee.

Manufactured by the Sprague Manufacturing Co., Omaha, Neb. Write for prices and literature.

Never-Leak Gaskets combine two standard cylinder gaskets made of copper with a layer of asbestos fabric between the surfaces. These gaskets are carefully made and reinforced at the vital points. They may be obtained for a great number of standard cars and are cut to fit, requiring no alterations. The same firm also manufactures gaskets for practically every part of the engine where packings are necessary.

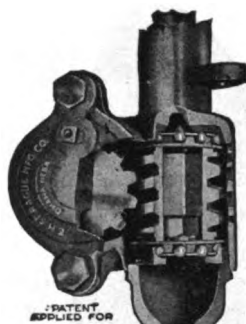
Manufactured by the Fitzgerald Manufacturing Co., Torrington, Conn. Write for catalogue and prices.

Eureka Grinding Compound is made to be safely used on any gasoline engine and the choice of three grades is given: Fine, medium or coarse. It is put up in one-pound cans, which are of the compression type, absolutely air tight. This product has long been popular with discriminating manufacturers, engineers, garage dealers and repair men.

Distributed by J. H. Faw, Inc., 37 Warren St., New York City. Write for prices.

The New Era Foot Accelerator can be attached to any Ford car in a few minutes. There are no holes to drill nor is any machine work needed. It furnishes a perfect foot control and enables the driver to get the car under full speed in a minimum amount of time, and leaves his hands free to operate the steering wheel, horn or brakes.

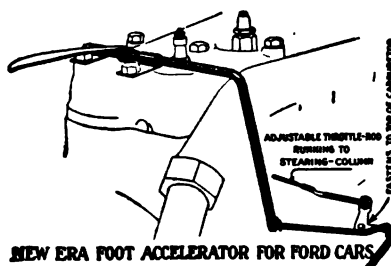
Manufactured by New Era Spring and Specialty Co., 1177 Hamilton Ave., N. W., Grand Rapids, Mich.



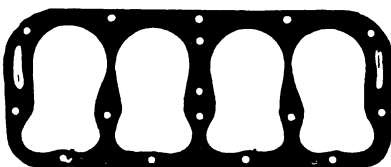
E. H. SPRAGUE
Ball Bearing Floating Ped.
Worm Steering Gear



Permatex Products.



NEW ERA FOOT ACCELERATOR FOR FORD CARS



A Never-Leak Gasket.



Circular Glass Cutter.

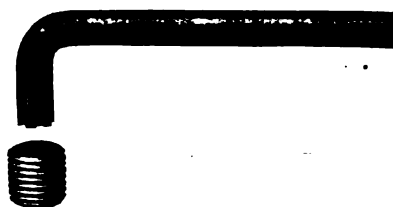


Eureka Grinding Compound.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Economy Vapor Plug.



Bristle Safety Set Screw.

The Economy Vapor Plug is an auxiliary air valve and is attached to the intake manifold. It is adjustable in such a manner as to obtain maximum results on the engine. Once this plug is installed it works automatically at all times without further attention. It is attached by drilling a 11/32 inch hole in the intake manifold just below the spread. Thread with 1/4 inch pipe tap and the plug is easily manufactured by the Ariston Co., Warren, O. Write for prices and literature.

The Bristle Safety Set Screw is equipped with dove-tailed slots or flutes, into which the corresponding dove-tailed projections of the wrench fit. When these set screws are being set up by means of this special wrench there is no tendency for the wrench to expand or split the screw, even if great pressure is applied to the handle of the wrench, but instead there is a tendency for the wrench to contract the screw on account of the angles at which the faces of the dove-tailed flutes and slots bear against each other.

Manufactured by the Bristol Co., Waterbury, Conn. Prices for standard and special screws sent upon request. Write for samples.

The Circular Glass Cutter shown in the illustration has a graduated beam that can be quickly and firmly set to cut circles of any size from two to 12 inches in diameter. Each of the cutters is provided with a high grade cutter wheel which has been carefully honed and tested by actual cutting before being mounted in the tool. The standard is equipped with a rubber base to prevent slipping.

Manufactured by Goodell-Pratt Co., Greenfield, Mass. Price 70 cents.

Permatex Heat Resisting Gasket Cement is an extra heavy preparation compounded for use on cylinder heads, carburetors, manifolds, crank cases, gear cases, spark plugs and pump gaskets. It has no harmful action on cardboard, paper, leather, rubber or asbestos or metal, and it is impervious to gasoline, kerosene, oil and water. It is applied in a thin coat to both sides of the gasket just before the gasket is put into place. The makers claim this mixture possesses a heat resistance of five times that of shellac.

Prepared by Constant A. Benoit, Brooklyn, N. Y. Write for prices.

S R B Stanford Bearings are a strictly high grade bearing in design, material and workmanship. It is produced from the highest grade of chrome alloy steel, is made with the same care as the regular S R B taper roller bearings. It is a bearing that absolutely prevents the rollers from going out of line. Race and cone are ground and the rollers cut to a perfectly true taper, making the bearing run freely. It is easily installed and will withstand heavy strains.

Manufactured by the Standard Roller Bearing Co., Philadelphia, Pa. Write for prices.

The Imperial Primer is a simple, easily installed device that is operated from the cowl dash and is designed to spray a rich mixture of vaporized, fireable gasoline into the manifold, near the intake ports and thus insures a quick start in cold weather. The device consists of a small, substantially made plunger pump (K) with the necessary bolts, connections and tubing for mounting upon the dash of any car. To the pump are connected two tubes (L and N). The (N) tube is connected with the priming tank (P), into which is placed high test gasoline obtainable at practically any drug store. The pipe (L) connects with the intake manifold (R and M).

Manufactured by the Imperial Brass Manufacturing Co., 1200 West Harrison St., Chicago, Ill. Write for literature and prices.

The Dow Body Brace for Ford Cars stiffens the body and gives rigid support to the running boards, preventing the latter from giving and working loose from constant use. It is made of a strong steel angle brace, which is secured to the frame midway between the axles with board sections at the ends, which fit in the channels of the running boards. The weight complete is 12 pounds.

This device enables the owner to carry such accessories as batteries, tool boxes, baggage, etc., that would bend the running boards without a support.

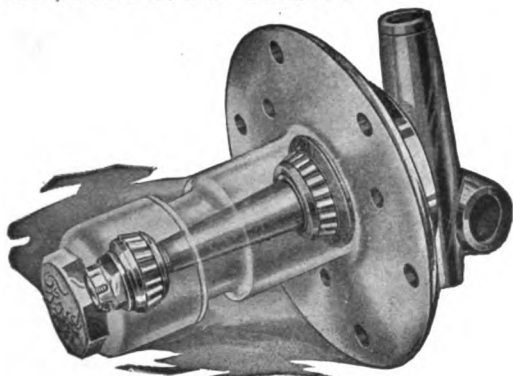
Made by the Dow Wire and Iron Works, Louisville, Ky. Retail price, \$3.

The Wright Roller Bearing is designed for the front wheel spindles of the Ford car, exactly similar to bearing now used for high class automobiles. This bearing is unique in that it has no cage or retaining mechanism to hold the rolls in the raceways, and it is thereby possible to use more rolls than the conventional type of roller bearing. The makers claim approximate increase of 50 per cent. in the number of rolls possible in the same size bearing. It fits the Ford spindle with no mechanical change and presents no more difficulty in installing than the replacement of the present bearings.

Marketed by the National Bearing Service Co., Philadelphia, Pa. Write for prices and literature.

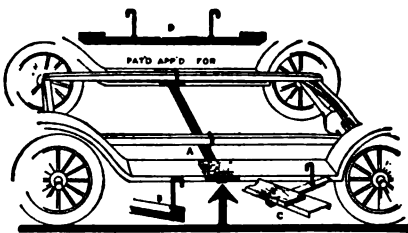
The Peugeot Type Cylinder Head should be an attractive proposition for the owner who is remodeling his Ford car for speed work. This cylinder head is made of a special grade of semi-steel nickel plated and water jacketed, and fitted with 16 overhead valves, which open directly into the explosion chamber and are operated through push rods, which extend to the regular Ford tappets. The design is such that the spark plugs are located in the center of the combustion chamber. All holes in the cylinder and manifold are Ford standard, therefore no drilling or tapping is necessary. The application of this head is very simple and the makers claim an increase of approximately 100 per cent. in horsepower and much gasoline efficiency.

Manufactured by Laurel Motors Corporation, Anderson, Ind. Price, \$95.

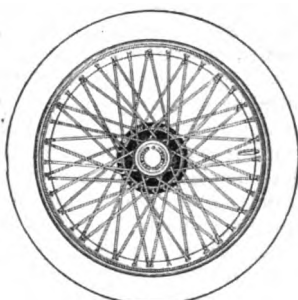


Wright Roller Bearing Designed for Ford.

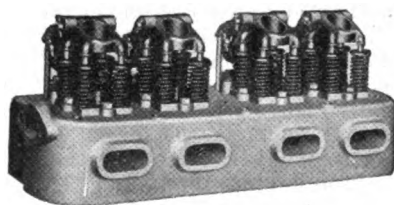
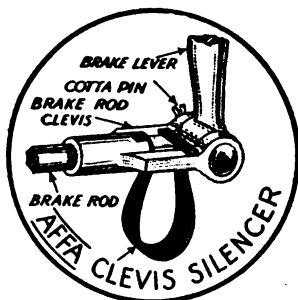
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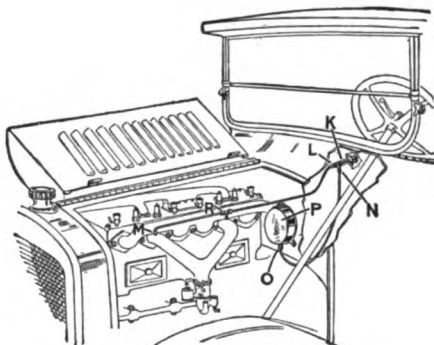
Dow Body Brace for Ford Cars.



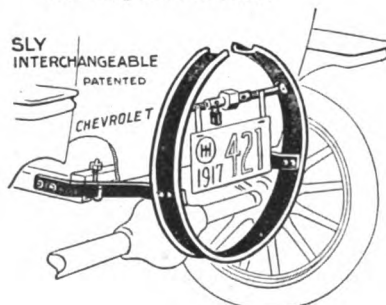
House Type Wire Wheels.



Peugeot Type Cylinder Head.



The Imperial Primer.



Sly Tire Holder.

The House Type Wire Wheels are less liable to collapse under the shocks of violent collision or skidding blows than the wooden wheels. Each spoke will stand a strain of \$200 pounds. There are 54 spokes in a single wheel. A set consists of five wheels, four inner hubs, four hub caps, one dust cover for spare wheel and two wrenches, one for the hub caps, another for the spoke nipples. These wheels will stand up and keep going under all road conditions. The inner hub has 10 tapered serrations that fit into and grip the corrugations inside the hub shell. The mechanical locking latch is inside the hub cap and is released by a special wrench, but locks itself automatically to the inner hub and prevents the wheel from rolling off.

Manufactured by the Wire Wheel Corporation of America. Factories: Buffalo, N. Y., and Springfield, Mass. Service department headquarters, New York City, N. Y. Direct factory branches and service stations in New York, Philadelphia, Chicago, Detroit, Los Angeles and San Francisco.

The Apco Horn Button Attachment, which is designed to hold the horn button on the center of the top of the steering wheel, consists of a complete unit with button, and is finished in black enamel. When packed in a box its shipping weight is two ounces. The Apco spindle arm anti-rattler is also shown, which is designed to prevent movement and rattling of the spindle arm bushing. The device consists of two heavy formed springs so arranged that undue movement of the spindle arm is prevented.

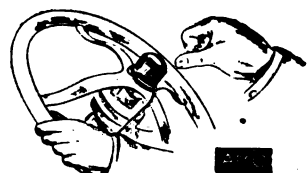
Manufactured by Apco Manufacturing Co., Providence, R. I. Price for anti-rattler, 50 cents a set; for horn button complete, 50 cents; horn button attachment without button, 25 cents.

The Cuno Timer is a high class, well built timer for replacement on Ford cars. It is made of light weight steel and is practically indestructible. It is finished in black enamel. The construction is such that it can be attached to any model T Ford car without any change. Constant lubrication is affected by splash from the oil well formed by the groove behind the fiber ring, which is filled occasionally through the oiler. The roller assembly is light, simple and strong. The roller and pin are made of special steel and are hardened.

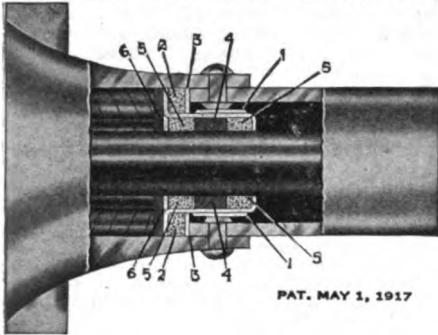
Manufactured by the Cuno Engineering Corporation, Meriden, Conn. Price complete, \$1.50.

The Sly Interchangeable Tire Holder is designed for both Ford and Chevrolet cars. It resembles a quick detachable rim and is bolted to the rear of the car. When the tire is in place an expanding device is turned, locking the tire upon the rim or holder, and can be used with or without demountable rims. A padlock prevents the loosening of the expansion nut and prevents removal by an unauthorized person. On the holder are provided places for a number plate and a tail lamp.

Manufactured by New Era Spring and Specialty Co., 1177 Hamilton Ave., Grand Rapids, Mich. Write for prices. Special terms to jobbers.



Two Apco Specialties.

Shurnuff GREASE RETAINER

1. Steel Cup. 2. Large Felt Washer. 3. Large Steel Retaining Ring. 4. Asbestos Washer. 5. Small Felt Washers. 6. Small Steel Retaining Ring.

Shurnuff Grease Retainer for Ford axles consists of three felt washers, one rubber asbestos washer, a cold drawn steel cup and two retaining rings. The retainer remains stationary, the two rivets that are already in the axle preventing it from turning. The company furnishes a counter display free to dealers with each dozen pairs.

Manufactured by the Shurnuff Manufacturing Co., St. Louis, Mo. Price 90 cents per pair.



Automobile Gauge.

The U. S. Dash Board Sight Feed Oil Gauge shown in the accompanying cut has a heavy cast case and ring. The flanges are cast solid to the front part of the case, permitting it to be mounted practically flush on the dash. The interior of the case is finished in white enamel. This gauge matches in size, shape and finish the company's 1913 design automobile pressure gauges and can be mounted with the other, retaining a uniform and elegant finish on the dash. They have standard connections, $\frac{1}{4}$ inch female pipe thread on the inlet and $\frac{1}{4}$ inch on the outlet.

Manufactured by United States Gauge Co., 67 Wall St., New York City. Price with two-inch dial finished in brass, \$4; nickel finish, \$4.60.

PROPER LUBRICANTS ELIMINATE MOST MOTOR TROUBLES.

Motorist Should Have Everything to Provide Thorough and Efficient Lubrication Throughout.

Imagine running the world's work without lubrication! The havoc that would be wrought by friction would result in a complete wreck. The proper lubrication of a motor car is absolutely necessary. Lubricating oil is as vital an essential to the motorist as fuel, the only caution required is to use it constantly on all parts calling for lubrication and to use good judgment in selecting the particular grade for your car. Neglecting to properly lubricate all moving parts of the car is the "sin of omission." The grade of oil selected should not be too heavy or too light. The heavier or thicker oils retain considerable carbon that is burned and accumulates on the pistons, valves and cylinder walls. Too light a grade has too much carbon extracted from it and on that account lacks the viscosity that is necessary for an efficient lubricant. Oil men, as a rule, are only too eager to advise motorists correctly as to the proper grade of oil to use in their motors, as their experience with the problem of proper motor lubrication has been gained by years of exhaustive tests.

In overhauling used cars, all the repaired and renewed parts, as well as those not necessary of overhaul, must be well oiled to start them on the way for the most efficient work. Then the good work once started should be regularly continued. Some of the best and most well known lubricants are put up in sealed retainers, convenient for the use of motorists. These brands are scientifically graded for the particular purposes for which they were prepared.

Thirty-five thousand dollars was lost by a renowned racing driver on account of the lack of oil. In 1912 Ralph de Palma, driving a Mercedes, lost the 500-mile race on the Indianapolis speedway because he neglected to stop for oil. He had been driving his car most consistently up to within the last two laps of two and one-half miles each, leading his nearest competitor, a National, by 15 miles. He neglected to stop at his pit to take on oil, although he realized that his supply was very low. On the second turn from the starting point, one of the connecting rod bearings burnt out, broke and was driven through the bottom of the crank case. He could have hazarded a few extra miles on doubtful tires, or with a small amount of water in the cooling system, but without lubricant in the proper quantities and in the proper places the automobile is a machine that soon ceases to function and the damage resulting from the lack of oil is usually extensive. The experienced motorist never neglects to look over his oil and grease cups every day to be sure that they are filled and functioning properly. This precaution if made a custom is one of the most important points to observe.



Simplex Grease Gun.

Simplex Grease Gun loads and ejects grease in 30 seconds. It is simple to remove the lower cap, insert the gun in the grease and pull up the plunger. Slip off the outer sleeve and the gun comes out as clean as a whistle, all the superfluous grease being left on the outer sleeve. The gun itself can be handled without the least danger of soiling hands or clothing.

Distributed by the Hilarichs Manufacturing Co., Chicago, Ill. Write for prices and literature.

Dixon's Non-Leak Grease No. 680 solves the problem of grease exuding from the rear axle to the brake bands and wheels of the car. Excess grease not only detracts from the appearance, but also produces a danger element, in that the lubrication of the brake bands prevents their proper functioning. It is composed of selected flake graphite, thoroughly mixed with a special adhesive lubricant.

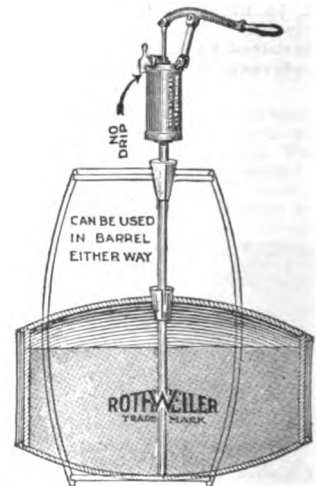
Manufactured by Joseph Dixon Crucible Co., Jersey City, N. J. Write for booklet and dealer's proposition.

Evr-Lastin Gear Compound is a gear and chain lubricant that is the result of many years experience in developing lubricants. It is composed of five products that make a strictly distinct lubricant for the lubrication of transmission and differential, bevel, spur or worm gears. It is dark in color and very tenacious and it clings to the surface of the metal under heavy pressure. The makers claim that it is only necessary to pour into the gear housing one-third the quantity of this lubricant that is ordinarily required and thus a large saving is accomplished. Furthermore, it is claimed to last pound for pound, three or four times as long as the ordinary transmission oil or grease.

Manufactured by the Imperial Oil Co., St. Louis, Mo. Write for prices.

The Rothweller Pump effects a saving of oil and greater efficiency in handling lubricants for the motor car. This device consists of a pump which delivers a full quart of oil at each stroke, equipped with a type of spout designed to eliminate dripping, mounted on a long suction pipe, which will reach to the bottom of an ordinary oil barrel standing on end. The suction pipe is fitted with a tapered plug and with this feature can be used in the barrel either from the end or side.

Manufactured by Rothweller & Co., First So., at Hanford St., Seattle, Wash.

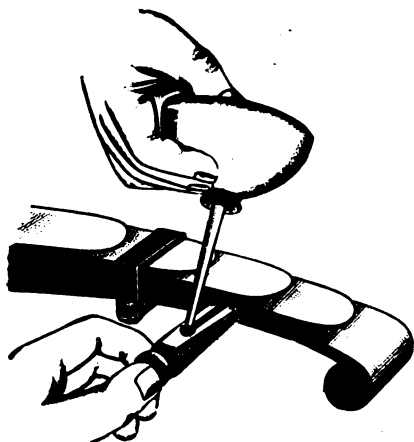


Dixon's Non-Leak Grease.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

THE MANY ECONOMIES IN THE PROPER SPRING FUNCTIONING.

Use of Shock Absorbers, Spring Oilers, Covers and Other Devices Lengthen Life and Service of Car.



The Cochran Spring Oiler affords an easy and simple method of getting oil between the springs of the car. To use, the car weight is lifted from the springs by means of jacks and the oiler simply inserted between the spring leaves and the oil squirted into the groove of the oiler, from which it flows to the lubricating points.

Manufactured by the Cochran Pipe Wrench Mfg. Co., 7800 Woodlawn Ave., Chicago, Ill. Write for price and literature.

The Roche Featherride Shock Absorbers overcome the side sway at the source of the sway, the spring shackles. They hold the car plumb and give to the Ford the stability of heavier cars. Two small malleable iron jackets, a heavy steel coil spring and two bolts complete the device, and they are easily attached.

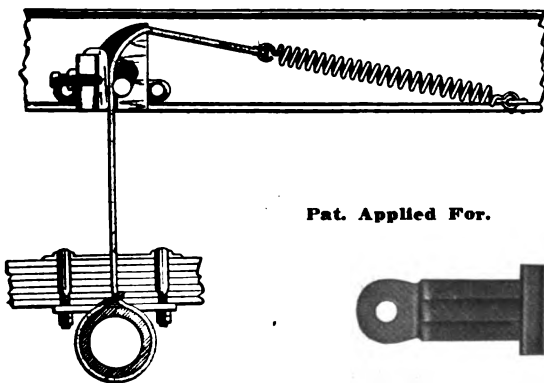
Manufactured by the Roche Electric Mfg. Co., Grand Rapids, Mich. \$7.50 per set of four.

Champion Shock Absorbers are built exclusively for Ford cars and are designed to absorb the jar and recoil from the springs. The pivot seat of the two coil springs act as a bearing for the main springs and allow free oscillation of the working parts. The car rides on the springs and off the springs, equalizing each motion in balance, making the action of one spring compensate for that of the other.

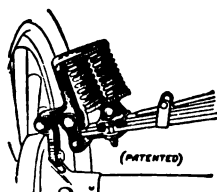
The Champion Shock Absorber Sales Co., Indianapolis, Ind. Two for the rear wheels, \$8; set of four, \$15.

The Common Sense Shock Absorber is a new device designed to absorb and prevent the recoil of automobile springs. When the car passes over an obstruction in the road and the axle and chassis come together, the coil spring contracts and takes up the slack in the strap. The rolling wedge device permits the passing or slipping of the strap upward, but offers considerable resistance to its downward travel.

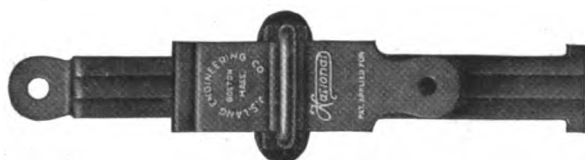
Manufactured by Common-Sense Manufacturing Co., Runyan St. and Sherman Ave., Newark, N. J. Write for prices.



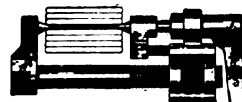
Common Sense Shock Absorber.



Champion Shock Absorber.



National Shock Absorber.



Weisse Leaf Spreader.

The Weisse Leaf Spring Spreader when adjusted to the springs requires but one simple operation of the lever, which is rotatable and can be worked or operated at any angle, spreading the springs apart and locking itself into this position, whereupon the springs may be sufficiently lubricated. It can be operated on springs varying from 1½ to 2¼ inches wide, all parts being interchangeable and practically indestructible.

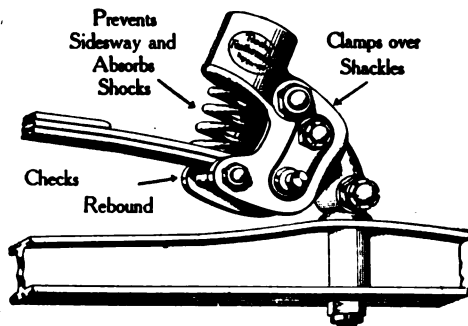
Marketed by A. F. Weise, 133 W. Washington St., Chicago, Ill. Write for prices and literature.

The G. L. W. Spring Oiler consists of a felt pad with an oil reservoir, contained in a rust proof polished blue metal case. This case snaps over the main leaf of the spring and is so constructed that different degrees of pressure is brought to bear on the felt pad, making the ends perfectly tight and oil proof, thus keeping the top surface of the main spring perfectly clean. At the sides the pressure on the felt is such that it permits a very slow seepage of oil, which fills the grooves along the entire side and is carried between the leaves by capillary action. The manufacturers of this accessory allow a 30 days trial, with money refunded, if not satisfactory, and in addition to this make a sweeping guarantee to replace any spring on any automobile if broken after a set of G. L. W. automatic spring oilers has been put in use on the car springs three days.

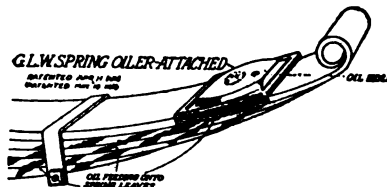
Marketed by the Hudson Sales Co. Factory branch G. L. W. Spring Oiler Co., 7 East Jackson Blvd., Chicago, Ill. Price, 20 cents each.

The National Shock Absorber consists essentially of a casing through which two blades pass, the movement being controlled by a set of specially designed shoes and cam rollers. The result of this construction, the makers say, is a unique but scientifically correct mechanism which permits perfect freedom of contraction of body springs, thereby preserving all their initial resiliency, but so retarding or modifying the rebound as to eliminate all shocks and vibrations.

Manufactured by J. S. Lang Engineering Co., 5 Park Square, Boston, Mass. Prices upon request.

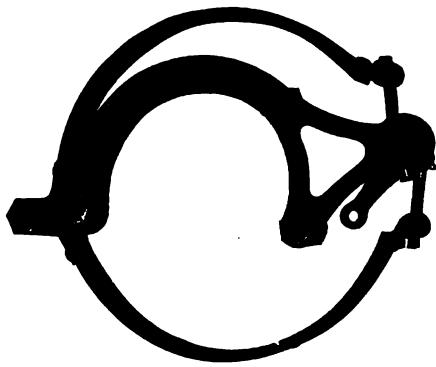


Shock Absorber.



G. L. W. Spring Oilers.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



The Holdford Brake, as the name indicates, is designed primarily for Ford cars and may be used in addition to those on the car, or to take the place of either the service or emergency brake. This brake is made from the best of materials, the points where the greatest strain comes are drop forgings, and the lining is J. M. Non-Burn. It is so designed as to be efficient under all conditions, bringing full contact with the external surface of the brake drum, after the first adjustment, until the lining is completely worn out. It may be connected to the foot pedal by means of an equalizing bar, thus relieving the transmission of strain and furnishing a positive brake at all times. In using it on the hand lever the internal brake may be left inside the brake drum or thrown away, according to the car owner's pleasure. In applying the brake no changes in the car are necessary.

Manufactured by the G. H. Dyer Co., Cambridge, Mass. Price per set when applied to hand lever, \$10; for application to foot pedal, \$15.

The D. & O. Anti-Wobbler is a simple, substantial device for preventing the wiggle and jiggle of the Ford steering wheels. It is easily attached to the center of the front axle in a few minutes and the makers claim it to eliminate driving accidents by holding the front wheels true at all times, thus preventing loss of control.

The G. H. Dyer Co., Cambridge, Mass. Write for price and literature.

The Dyer Towing Device is a simple arrangement for fastening to the front axle of a Ford car and making possible the towing of the car by another without the aid of a second driver. The device is designed for attachment to the axle and is fitted with a clamp, which is fastened to the steering spindle connecting rod. The other end of the device is fastened to the towing car. When a corner is turned the rear car is automatically steered by the device.

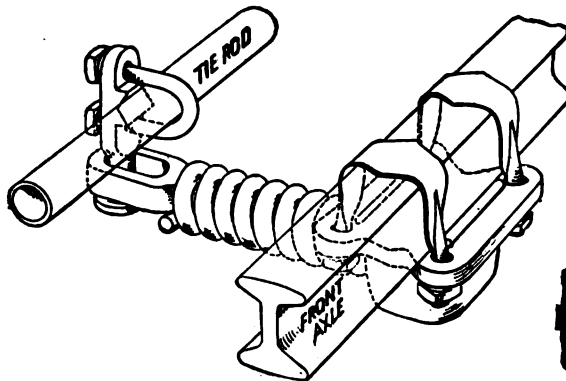
Manufactured by the G. H. Dyer Co., Cambridge, Mass. Write for prices and literature.

Brake Shoes for Fords are made in two types, one type being unlined and the other lined with asbestos, having wire insertions and riveted to shoe. The face of these shoes which are in contact with the cam are specially hardened, preventing them from wearing down out of true, and adding materially to the shoe's life.

Manufactured by Adamson Manufacturing Co., East Palestine, O. Write for prices and literature.

Hoyts' Rear Axle Truss, made specially for Ford cars and prevents the rear axle from sagging, to relieve undue strain on differential and keep the differential housing in condition.

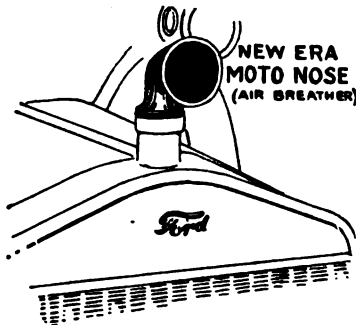
Manufactured by Hoyts' Auto Supply Co., 370 Fairfield Ave., Bridgeport, Conn. Price, \$1.50.



The D. & O. Anti-Wobbler.



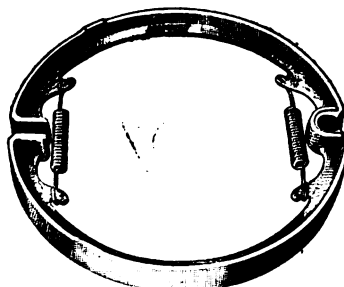
Pedex Pedal Extension.



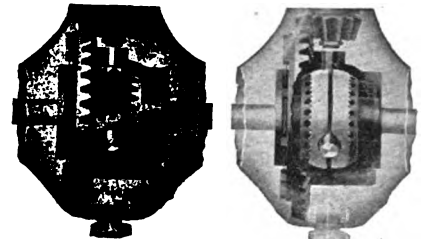
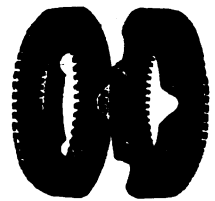
New Era "Moto Nose."



Hoyts' Rear Axle Truss.



Brake Shoes for Fords.



Badger "Two-Wheel Drive" That Applies Power to Both Wheels.

The Badger "Two-Wheel Drive" Differential always applies the power on the wheel offering the greatest resistance. This means that the car is held steady and true to the line of drive. On a slippery surface, or when traveling in sand or mud, the wheels take the full power of the engine, thereby eliminating waste of power and wear on the tires through the spinning of one wheel. The car holds the road no matter how sharply crowned, muddy or slippery. The makers claim it is easily installed by simply taking out the three pinion gears and inserting the two Badger gears, using the same spider. The illustration tells the whole story. It is claimed that any Ford owner can do the work with his regular set of tools, or the garage can do it in from two to three hours. An attractive offer is made distributors and dealers to handle the Badger Differential.

Manufactured by the Lewis Differential Co., Milwaukee, Wis. Write for prices and literature.

Pedex, a pedal extension device, makes it possible for two persons of different height to drive the same car with equal comfort. Pedex is designed to be attached to both the brake and clutch pedals, and the use of the permanent pedals is in no way impaired. Two adjustments are possible, so that the foot may be placed in a position of greatest comfort. In touring this article is a great help to the driver, making it possible for him to rest his feet by shifting to a new position.

Manufactured by American Car Accessories Co., 529 West 21st St., New York. N. Y. Price, \$5 per pair.

The New Era "Moto Nose" for Ford cars follows the old ship funnel method of ventilation. It keeps the water in the radiator from getting hot by taking cold air into the radiator over the surface of the water and relieving the internal air pressure of the radiator. It is made of metal, neatly designed and highly finished. A screen in the funnel opening prevents dirt and other foreign matter from entering.

Manufactured by the New Era Spring and Specialty Co., Grand Rapids, Mich. Price, black, \$1.00; nickel, \$1.50; West of Denver add 10 per cent.

The Carson Kickless Crank eliminates the danger of injury from back firing when cranking an automobile engine. This device is sold under a forfeit of \$100, which may be collected from the manufacturers in case a person using the device is injured by the kick of the crank handle. The mechanism of the device is quite simple and it is claimed that there is practically nothing to break or get out of order. It can be attached in a few minutes.

Manufactured by Carson Manufacturing Co. of Richmond, Va. Price, \$7.50.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Dyer Lightweight Piston.

The Dyer Lightweight Piston is designed to fill a want for a light yet strong piston for Ford cars by the owner who is remodeling his car. The piston is made of a specially tough metal carefully machined and has special oiling features. These pistons are made in standard and oversizes and are sold complete with wristpins and rings. Each piston weighs $2\frac{1}{4}$ pounds, or one pound less than the Ford piston. In addition to the extreme light weight is the feature of uniform balance; each piston is limited to a variation of two ounces.

Manufactured by the G. H. Dyer Co., Cambridge, Mass. Write for prices and literature.

The Taylor Leakage Proof Ring the makers claim does away with all loss of compression, oil throwing, carbon trouble and loss of power. The interlocking, underlapping joint makes a perfect seal, which compression or explosion gases and oil cannot break. It is made in $3\frac{1}{4} \times \frac{1}{4}$ and $3\frac{1}{4} \times \frac{3}{16}$ sizes and is strong and durable, being ground to accurate size. It wears uniformly, having no points to break or catch carbon.

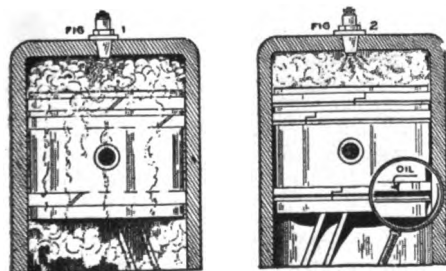
Manufactured by the G. H. Dyer Co., Cambridge, Mass. Write for prices and literature.

The No-Leak-O Piston Ring or Oil Sealing Ring is a specially designed piston ring that has a deep groove cut around the face of the ring with a scraping edge, in combination with a lap joint, which is said to form a perfect seal of oil; that is to say, with the groove full of oil around the ring, the gas cannot escape, the refuse of poor oil cannot work into the crank case, nor can the oil from the crank case work into the combustion chamber.

Write for booklet M, Automobile Accessories Co., 816 W. North Ave., Baltimore, Md., or to Auto Appliance Co., room 500, 110 W. 34th St., New York.

M-P Piston Rings are of one piece construction and are guaranteed by the manufacturers to produce perfect compression when installed in cylinders that are not warped or scored. This ring is made of special close grained cast iron and is accurate by machine to the .001 part of an inch of specified dimensions. The illustration shows clearly the simplicity of design and one piece construction.

Manufactured by the Metal Products Co., 3205 South Broadway, St. Louis, Mo. Prices for $5\frac{1}{4}$ inch in diameter to $5\frac{1}{2}$, \$1.50; four inch to $4\frac{1}{2}$ inch, \$1.25.



No-Leak-O Piston Ring.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

REPLACEMENTS OF THE PISTON RINGS AND PISTONS.

Various Articles on the Market Which Restore the Lost Efficiency in Old Engines.

Pistons may be obtained from the manufacturer of the car or from many outside manufacturers who make a specialty of making pistons for widely used cars.

There is a variance of opinion as to the proper composition of the material of pistons. Pistons of an aluminum and alloy composition are preferred by many dealers and others claim that their surface is so smooth that they let the oil get by the rings and throw the oil into the combustion chamber. The argument in their favor, however, is that they are one-third lighter than cast iron pistons, reducing the contact against the cylinder walls, caused by the side to side motion of the connecting rod, thus reducing friction and consumption of lubricating oil. They also withstand great heat and are not easily warped out of their true shape, as such distortion of shape would injure the cylinder walls. Some prefer cast iron pistons, because the metal is more porous and retains the lubricating oil for more perfect lubrication. Oversized pistons for the Ford car, to accommodate worn cylinder walls, are manufactured.

Piston rings are made with an expansion sufficient to hold the compression at every point in its circumference and to prevent the escape of the gas from the explosion chambers. Rings lose their expanding and contracting strength after extreme use and then must be replaced by new ones. A gap is used on all piston rings, which serves to expand and contract the ring, and allows of putting pistons on or for removal. Various types of rings employ different shaped gaps. Experts advise against too tight a gas and compression holding type of ring, because it is liable to prevent the lubricating oil from covering the full length of the piston and cylinder wall.

Various causes are attributed to leaky piston rings: Stuck in the groove, due to a gummy deposit from oil, thus preventing them from pressing against cylinder wall; broken rings that reduce the pressure; joints in line with each other, allowing compression to escape; rings worn from lack of oil; rings poorly fitted to grooves.



Taylor Leakage Proof Ring.



Micro Piston Ring.

Micro Piston Rings are made in two parts and designed to eliminate piston compression leakage. The outer ring seals the opening in the inner ring, and it is said that an equal expansion against the cylinder wall in all directions, producing perfect contact at every part, is obtained.

Manufactured by Micro Piston Ring Co., Inc., 110 Nassau St., New York. Prices upon application.

Pressure Proof Piston Rings, the makers claim, eliminate all possibility of either oil or gas to pass between the cylinder walls and the pistons. The spring expander automatically takes up any excess in the ring groove, thus eliminating the causes of carbon and poor lubrication and effecting the restoration of maximum power.

Manufactured by the Pressure Proof Piston Ring Co., 168 Massachusetts Ave., Boston, Mass. Write for prices and literature.

The GHI Piston Ring is of one-piece construction of the concentric type, and with a joint so constructed that it can be opened more than $\frac{1}{4}$ inch without there being a direct opening through which oil or compression can pass. The construction of the joint eliminates the use of an extra part to close it. Each ring is made from an individual casting, the scale being left on the inside surface to insure a permanent tension. The joints are cut from the rough castings, and rings are ground with the joints closed, which insures it being a perfect circle when closed.

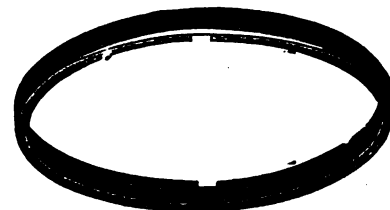
Marketed by Craig-Wyman Co., 93 Massachusetts Ave., Boston, Mass. Prices \$1 and \$1.25 according to size.

The Tell-Tale Piston Ring is made of a metal which is capable of withstanding a great heat without losing its tension. Each ring is individually cast and retains its scale or resilient strength when finished. The wearing edge is turned and so adapts itself to the cylinder in which it slides. Around the outside is turned a shallow groove or wiping chamber, which is designed to collect any surplus oil and allow it to escape into the crank case through vertical channels cut to the groove at intervals. The joint is of the familiar square lap type, in effect two rings but only one casting.

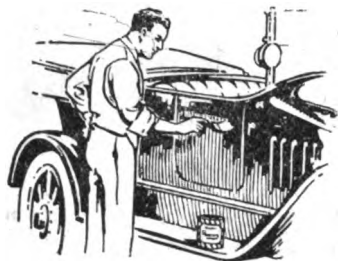
Manufactured by Vulcan Machine and Tool Co., St. Louis, Mo. Write for prices.



Tell-Tale Piston Ring.



Jointless Ring, Made by Detroit Piston Ring Co.



Panvar Car Refinisher.

The Panvar Car Refinisher is a lasting liquid luster that can be handled with excellent results by the amateur. It dries over night and is quickly applied, is self-leveling (which means that it will dry out evenly and not show brush marks), dries with a hard, glossy finish, and being transparent can be used on any colored car, seats, tops and plated parts. Luster will last as long as varnish, and the makers claim will not crack, creep, peel or turn white from the effects of water or steam. Sells for \$1.50 a quart. A quart will do a car.

The Panvar Co., 706 Bulletin Bldg., Philadelphia, Pa. Write for trade prices.

Pontoklene is a product of the well known Du Pont Chemical Works and is used for removing grease, oil or tar from the motor car, while at the same time restoring the original polish of the car without rubbing. It is also used for cleaning engines and is superior to gasoline for that purpose. In cleaning the automobile Pontoklene will save much time and labor, particularly where many cars are handled, as it will remove tar as readily as water washes away dust without injuring the finish of the body.

Distributed by E. I. Du Pont De Nemours & Co., Wilmington, Del. Prices: ¼ gallon, \$1; ½ gallon, \$1.50.

Spok Tite is a liquid preparation which tightens loose spokes and stops body squeaks. It is said to be uninjurious to painted or varnished surfaces and when applied causes the wood to swell and resume its normal proportions. The can is furnished with a handy spout and upon signs of looseness in the wheels a few drops of Spok Tite are squirted into the crevices formed by the drying up of the wood. The wheels may be left in place for the treatment and the action of the liquid is rapid.

Represented by Charlie Foster, 243 Columbus Ave., Boston, Mass. Write for prices. Distributed by Asch & Co., 16-24 W. 61st St., New York City, and Gray, Heath Co., 1440 Michigan Blvd., Chicago.



Spok Tite.
(When Writing to Advertisers, Please Mention The Automobile Journal.)

APPEARANCE HAS MUCH TO DO WITH THE VALUE.

Numerous Finishes, Restoratives and Polishes That Can Be Effectively Used by Amateur.

While the value of a car is in fact largely confined to its service value as represented in its mechanical condition, the value of appearance cannot be underestimated as upon this factor its selling price will largely depend, as the impression created by what a person sees is always more lasting than that derived from what they hear.

Whether or not, however, a person intends to dress his car up to sell or for his own satisfaction, makes little difference, as if he wants it refinished as new he will be obliged to take it to a professional coach or automobile painter, but the expense of such a job usually makes it prohibitive except in the case where the car is of the high priced type, and the expenditure of a hundred dollars or more represents but a small proportion of its value.

On the medium or low priced car it does not pay to make this outlay, particularly when a very good refinishing job can be accomplished by the average person with one of the many finishes on the market, sold to meet a demand of this nature. The luster and finish on a car as a rule does not dull or come off to the same extent all over the body, a fact which often makes it possible to touch the car up here and there with a restorative or finish and have a job that while possibly not as snappy as when the car came out of the paint shop, has improved its appearance wonderfully.

At the end of the first year of service the majority of cars need only a surface finish or polish to restore their lost luster and life, and for this work there are several articles on the market which are serviceable and of lasting quality.

The Simple System Automobile Painting, the makers claim, is identical in its qualifications with what a first class automobile painter would use, but the paint is put up in a ready mixed form, so simple that any amateur can get satisfactory results. The F. O. Pierce Co. for 50 years has been catering to the wants of painters who paint coaches, cars and automobiles. The consumer gets the benefit of their vast experience in manufacturing the right products for automobile painting; therefore, the "Simple System" is not guess work.

Manufactured by F. O. Pierce Co., New York City, N. Y. Write for prices and booklets.

Vietrolene is a scientifically compounded cleaner and polisher for automobiles. The manufacturers claim that it is unlike any other polish in that it leaves a hard dry luster that will not collect dust. It positively removes tar, tarvia and road oil. Satisfaction is guaranteed or money is refunded. It will clean leather and keep it soft and pliable.

Manufactured by Vietrolene Co., 39 Pearl St., Boston, Mass. Prices from 25 cents for half pint can to \$3 for one gallon can.



"Norwesco Utility Black" meets the big need for an all around utility enamel which the motorist can use for retouching all shabby metal parts of an automobile and that will be satisfactory for painting the engine. It is air drying and possesses heat baking qualities. After several months of testing and experimenting the Norwesco Laboratories have now added to their line of chemical specialties "Norwesco Utility Black." A black enamel designed for retouching all metal parts of an automobile such as the lamps, hood, radiator and fenders.

Manufactured by the Northwestern Chemical Co., Marietta, O. Pints and half pints retail for \$1 and 60 cents respectively.

Murphy Da-Cote Motor Car Enamels are manufactured specially to meet the demand from car owners for finishes which they can apply themselves. It flows smoothly without leaving brush marks and dries over night. The surface when dry is hard, glossy, durable and elastic. It is furnished in practically all the popular colors and shades and can be obtained from dealers in all the large cities.

Manufactured by the Murphy Varnish Co., Newark, N. J. Write for literature and prices.

The Wagner Engine Cleaner, which is operated by six pounds air pressure, enables one to clean places that cannot be reached in any other way and through its use one quart of kerosene will clean any size motor. The passage of the air through the cleaner head carries the kerosene with it in the form of a spray.

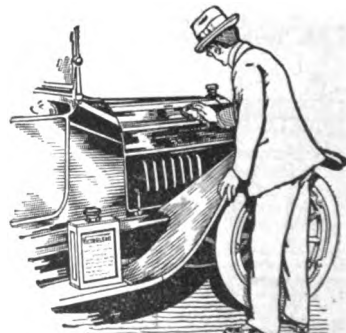
Manufactured by Wagner Specialty Co., 1902 Broadway, New York City. Price upon application.

"Proper Care of Your Car" is a booklet quite in line with the nation's plan of conserving and preserving. This booklet is chock full of practical hints for the motorist. It tells how to overcome and to correct some of the different ills a motor car is subject to. Unlike some booklets it gives more than one remedy for correcting the most common troubles. In fact, it tells just what its name implies.

Distributed by the Northwestern Chemical Co., Marietta, O. The readers of the Automobile Journal can secure a copy by writing.



Wagner Engine Cleaner.



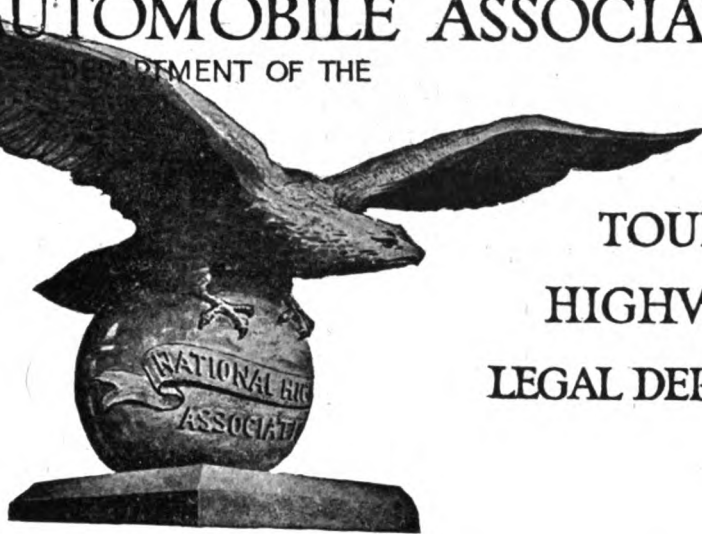
Vietrolene.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Announcement of Federal Road Policy For Duration of the War

Functions of Government Agencies Relating to Streets and Highways To Be Coordinated in United States Highway Council

All functions of government agencies relating to streets and highways hereafter are to be coordinated in a body called the United States Highways Council, composed of one representative each from the War Department, the Department of Agriculture, the United States Railroad Administration, the War Industries Board and the Fuel Administration. The council was formed primarily to prevent delays, financial loss and uncertainty incident to the method of taking up each highway problem in its turn with a separate and distinct government agency. This council was constituted at the suggestion of the secretary of agriculture. Through the department it will continue the close contact already established, both formally by law and informally by practice, with the state highway commission in each state of the Union.

Membership of the Council.

Membership of the board follows: War Department, Lieut. Col. W. D. Uhler; Fuel Administration, C. G. Sheffield; War Industries Board, Richard L. Humphrey; Railroad Administration, G. W. Kirtley; Department of Agriculture, L. W. Page. These representatives have selected Logan Waller Page, director of the office of public roads, Department of Agriculture, as chairman, and J. E. Pennybacker, chief of management of that office, as secretary.

The council utilizes the organizations of the 48 state highway departments with their trained personnel and their knowledge of local conditions and provides a single agency where all highway projects calling for governmental action

Need of Conservation.

of any character, whether it be a question of finance, of materials, transportation, or of war necessity or desirability, may be dealt with. The council has provided a definite form on which applications for relief are to be made through the respective state highway departments, and has sent supplies of the forms to the departments. It emphasizes the great need of conservation of money, transportation, labor and materials by restricting highway and street work to most essential needs. It ranks maintenance of existing streets and highways first, reconstruction of badly damaged streets and highways next, and it places last new construction justified only on account of vital war or economic necessity.

Governmental agencies dealing with highway problems fully recognize the vital military and economic importance of the country's roads, according to a letter from Secretary of Agriculture Houston to Arthur H. Fleming, chief of the State Councils Section, Council of National Defense.

The secretary, whose department ad-

ministers the Federal aid road act, stated also that the government recognizes that it is necessary to construct, reconstruct or maintain roads essential for military and vital economic purposes and to defer action on roads not of this class; and that it is desirable, wherever possible, to use local materials for road building and maintenance in order to relieve railroad traffic.

Important highways, as described in the secretary's letter, include only those utilized, or to be utilized, by the military establishment, those which carry a considerable volume of materials and supplies essential to war industries, and those which have a bearing on the production and distribution of food supplies, connecting population and shipping centers with surrounding agricultural areas.

Duties of Highway Council.

Attention is called to the formation of the United States Highways Council. This body was suggested by the secretary to coordinate Federal agencies interested in highway problems. The council is made up of a representative each from the Department of Agriculture, the War Department, the Railroad Administration, the Fuel Administration and the War Industries boards. It will form a unified agency for dealing, on behalf of the Federal government, with

highway construction, maintenance and policies. It will, of course, through the office of public roads and rural engineering of the department, continue the close contact already established, both formally by law and informally by practice, with the state highway commission in each state.

The office of public roads and rural engineering and the highways council will actively consider the supply, for highway purposes, of road oils, asphalts and other bituminous road materials controlled by the Fuel Administration, and the matter of priority production for highway materials controlled by the War Industries board. They will also, in contact with the railroad administration, aid in securing, so far as practicable, facilities for the transportation of road materials and supplies. Furthermore, the office of public roads and rural engineering will act as the medium for furnishing information and assistance on highway problems, especially to state highway authorities in meeting the various difficulties which they encounter.

Work Planned Before War.

When the United States entered the war the work of planning state highway systems, so that as far as necessary and feasible, they would connect with the systems of other states, was well under way. This resulted from efforts to administer the Federal aid road act so that the roads of vital importance for economic, military and other purposes should first be dealt with. The Federal aid road act—involving an aggregate five-year expenditure, directly and from state and local funds of \$160,000,000 in addition to at least \$200,000,000 spent independently each year by the states—provides that the states must maintain the roads and that before any money can be expended the roads must be selected and approved and plans, specifications and contracts submitted. It also provides that the Federal government must inspect the construction of the roads.

War Road Policy Adopted.

Soon after the United States entered the war the Department of Agriculture requested the state highway commissions to join it in directing expenditures only on roads of prime importance for economic and military purposes. In this undertaking the secretary says the department has received the cooperation of state authorities.

The department has been actively co-operating with the capital issues committee in its task of keeping out of the market road bonds the issuance of which was not urgent from the point of view of aiding the nation in winning the war.

NEW LICENSE TAG TO CONSERVE STEEL.

The prospect that the government will restrict the use of steel in the manufacture of license plates for automobiles, forecasts the need of a standard device to permit the continuous use of the present license plates, the provision for which seems to have been met by an invention of Dr. F. L. Wells of Rutland, Vt. This device seems ideal, as it embodies the essential features of econ-

omy, simplicity and utility, while effecting the purpose of conserving the steel plate material that would be used in manufacturing new license plates.



Showing Application of the Auxiliary License Tag.

It will be noted from the illustration that the large number plate in use at the present time remains the same and once attached to the car becomes a permanent fixture for the purpose of identification. The auxiliary or small attachable plate is colored in contrast to the big plate and it bears numerals denoting the year, together with smaller numbers in duplicate with the numbers on the larger plate, this method preventing illegal use of any other plate. On number plates that have the year's numerals, the auxiliary plate can be so shaped as to cover the old year and show in its place the new year numbers, together with the emblem of the state and duplicate number of the large plate. The crest of the state in the corner discourages counterfeiting.

In re-registering its automobiles it is only necessary for the state to furnish small plates, changing the year numerals and colors from year to year. In attaching two small machine bolts or other suitable means are employed. Size and shape may be qualified at the discretion of the state officials. The cost to the state, including royalties and auxiliary tags, would be from six to 10 cents a pair, according to the particular design selected. This method would also mean a considerable saving in postage.

Suggests Law To Restrict The Pedestrian

W. C. Poertner of the Motor Club of New York is of the belief that the campaign for lessening the accidents in motor car operation has gone far enough in the direction of restrictive measures against operators and that the question of the pedestrian's action should be taken up as a means of remedying the dangerous driving conditions in the congested cities. He favors an educational campaign to teach the people to cross the streets at the crossings only.

"Any one who drives a car cannot help but notice how often pedestrians leave the sidewalk in the middle of the block, attempting to cross the street at an angle and in nine cases out of 10 failing to look to see whether or not automobiles are approaching," says Mr. Poertner. "Frequently this means that the driver is forced to steer in an arc to get around the person or else pull his brakes sud-

denly, in a manner which endangers other automobiles that may be following closely.

"If there were an ordinance in force requiring pedestrians to cross only at regular street intersections they would learn to adhere to the rule, and the fact that chauffeurs as a rule slow down at a street crossing or are prepared to slow down would greatly lessen the number of accidents. Each season many children are injured not because of the faults of the motorists, but because of children dodging behind cars in the middle of the block. Of course it is more difficult to teach this to children than to adults, but much effective work could be done in this way by school teachers.

"The street car companies have accomplished considerable in their campaign, teaching women not to step off car platforms backward, and police regulations about automobiles coming to a standstill when pedestrians are getting on or off the street car, as well as the eight-foot rule, have resulted most satisfactorily, and nowadays there are far fewer accidents resulting from a combination of street car and automobile.

"In Paris I understand there is an ordinance that pedestrians must not cross the street in the middle of the block and when an accident occurs the pedestrian is liable to arrest for disobedience of the ordinance."

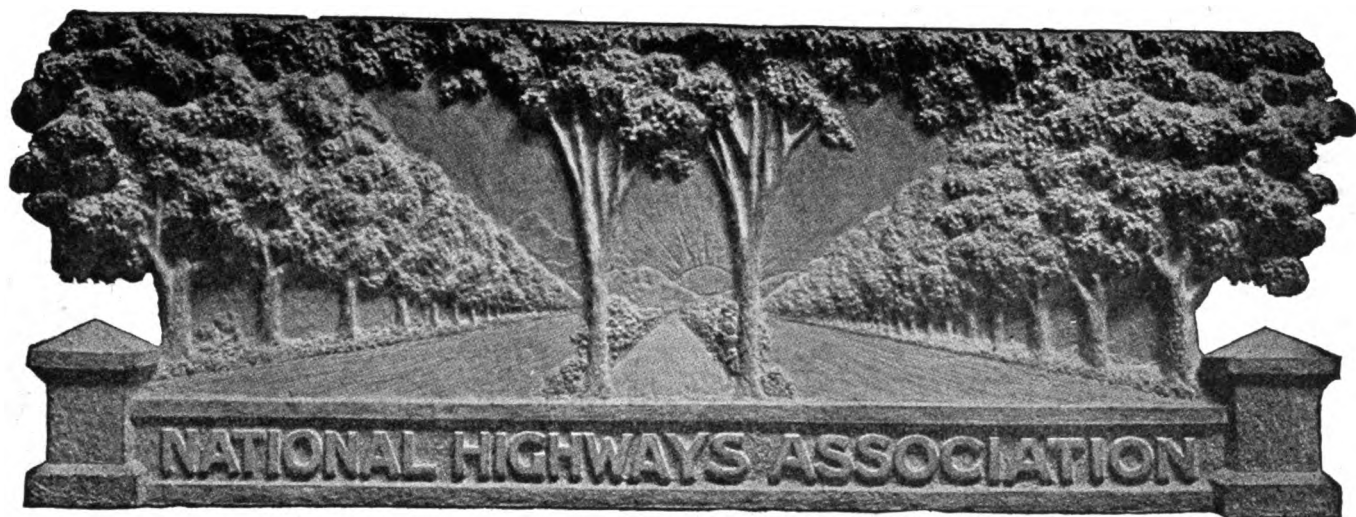
FEDERAL MOTOR CAR TAX UNDER DISCUSSION.

During a recent hearing before the Ways and Means Committee at Washington on the new Revenue Bill, F. W. A. Vesper of St. Louis, president of the National Automobile Dealers' Association, explained that the automobile dealers were willing to submit to a Federal tax. He said the increase in the tax on manufacturers' sales as imposed by the present law would not be opposed, but considered as unwise the proposal to levy a tax on gasoline because of the difficulty in differentiating between the use of a car for pleasure and its use in business.

He submitted to the committee a schedule of proposed taxes to be levied as a Federal license, to be collected and paid at the same time as the state or county tax is paid. This schedule, which has been approved by the association, is as follows:

On cars costing \$600 or less, \$5; on cars costing up to \$1100, \$10; on cars costing up to \$2000, \$15; on cars costing up to \$3000, \$20, and on cars costing over \$3000, \$25.

The average tax under this schedule would be \$13, and this on the basis of 5,000,000 cars in this country would produce \$65,000,000 annually. This tax, Mr. Vesper explained, would be in addition to the present manufacturers' tax, which the Treasury Department has estimated will bring \$32,000,000 for the current year. The total under this plan would approximate \$100,000,000, and Mr. Vesper told the committee that if it were found necessary to raise the rates under either form of taxation the dealers would not object.



Vermont Auto Law Again Under Discussion

The Vermont auto law, which has been considered ideal by many in that it does not prescribe any speed limits is again up for discussion and the controversy was started by a well known editor in that state who does not share the view of others as to the efficiency of the statutes.

The editor of the Bellows Falls Times sent a letter of inquiry to the Vermont secretary of state and asked if there was any state law regulating the fast driving of automobiles on the highways of the state and received the following reply:

"I am glad to comply with your request for a statement of my opinion in regard to the statutory provisions concerning running of automobiles upon the public highways.

"The statute provides that if a person runs an automobile at a rate of speed exceeding 25 miles an hour outside a city or incorporated village, or at a rate of speed exceeding 10 miles an hour within a city, incorporated village or the thickly settled part of a town, or at a rate of speed exceeding 10 miles an hour across any bridge of more than 50 feet span, it shall be prima facie evidence that the automobile or motor vehicle was run carelessly or negligently.

"The statute further provides that a person who does operate an automobile in a careless or negligent manner, upon conviction thereof, shall be imprisoned not more than 10 days or fined not more than \$50, or both, with costs of prosecution, for the first offense and for each subsequent offense shall be imprisoned not more than six months or fined not more than \$200 nor less than \$25, or both, with costs.

"The statute does not say that a person shall not run at a rate of speed exceeding the miles per hour as stated above, but states that the rate of speed in excess of such rate, shall be prima facie evidence of careless or negligent

driving, is a question of fact to be determined by the court or jury before which the case is tried."

Commenting on the letter, the editor of the Times says it shows that Vermont has no law that amounts to anything. If a driver goes through the streets of Bellows Falls at 60 miles an hour the fact that he is driving at that speed is prima facie evidence that he is careless or negligent, yet if he is arrested he may be able to prove that he is so skillful that 60 miles an hour for him is not as careless or negligent as 15 miles for a less experienced driver.

About all the man can do whose life is in danger from fast driving is to grumble. If he is killed or maimed a court might find that a driver was negligent, even though he was then driving at only half the speed he has repeatedly driven when no accident happened.

New York Traffic Plan Not Favored In Boston

The new traffic plan that is soon to be instituted in New York City and which was explained in detail in this department several months ago, does not meet with the approval of Superintendent of Police Michael Crowley of Boston, Mass., who is of the opinion that the system will place discretionary powers in the hands of the policemen which are equal practically to those exercised by a judge.

That this point is well taken seems reasonable when one studies the possible effects of the new plan, under which drivers are to be furnished with a registration card bearing their photograph and other unmistakable identification marks. If the driver is detected in a violation of the traffic rules, he is asked to surrender his card to the officer noting the violation. The card is then punched and returned to the driver; on the fifth punch he is summonsed into court and the card and accompanying data presented as evidence.

"In my opinion the plan is all wrong," Superintendent Crowley said. "In this state it would take a legislative act to put it into force, and the Legislature has already reported adversely on the plan.

"There is little chance of its coming up again, without much more evidence than was presented to support it. The police department would certainly be opposed to it.

"In the first place it puts too much responsibility on the individual officer, to decide whether an offense is serious or a mere traffic violation and not enough to warrant immediate arrest.

"Should one machine crash into another, for instance, the driver of the damaged car would consider the case warranting immediate arrest or worse, while the other driver would think it was a trivial mistake at the most. That would make it a difficult task for the officer, who would have to constitute himself a judge.

"As things stand right now there is enough automobile law, covering practically every emergency. Officers, as a rule, are familiar with these rules and laws, by police requirement, and collect the evidence for the judge to decide.

"A Boston police officer is not a judge. He is an instrument to aid in enforcement of the law and to prevent violations.

NO LICENSE FOR ALIEN ENEMIES IN NEW JERSEY.

Motor Vehicle Commissioner Dill of New Jersey in dealing with the case of John Vojs of New York, who had driven a car into that state without a Jersey license, stated that he would oppose the granting of a license to an enemy alien.

"I don't intend that any enemy alien shall get a license to drive in New Jersey," said Mr. Dill, "especially a man who has been in this country 11 years and has earned his livelihood here and then comes into this state and violates the law. There are enough Americans to drive cars, even after we have recruited an army big enough for all purposes on the other side. I shall place your name on our prohibitive list to be denied a license should you ever apply for one."

Personal News of the Industry in Brief

J. W. De Cou, for eight years factory manager of the Thomas B. Jeffery Co., Kenosha, Wis., and for two years factory manager of the Smith Form-A-Truck Co., has been appointed factory manager of the Ross Gear and Tool Co., Lafayette, Ind.

Mr. De Cou is one of the best known engineers in the motor car industry and established an enviable reputation as a production man at both the Jeffery and Smith Form-A-Truck plants and his energies are now devoted to increasing the output of steering gears made by the Ross Gear and Tool Co., which are the predominating type on motor trucks. He has already greatly increased the Ross production, the plant now turning out 6000 truck steering gears monthly, over half of which are used on trucks for the army.



J. W. De Cou, Factory Manager of the Ross Gear and Tool Co., Lafayette, Ind.

H. H. Brand has joined the American Magneto Co., Monroe, Mich. He was formerly secretary and treasurer of the Ohio Electric Car Co.

James G. Roe, formerly connected with the advertising department of the Hupp Motor Car Corporation, Detroit, and later with E. A. Nelson, Detroit, has enlisted in the tank division of the United States Army.

Finley R. Porter is now airplane engineer in charge of engine development. He was formerly chief engineer of the Mercer Motor Car Co. and afterwards designer of the F. R. P. cars at Port Jefferson, L. I.

W. I. Denny has resigned as purchasing agent of the Davis Manufacturing Co. and has joined the Ordnance Department of the U. S. Army. He has been succeeded by R. Bryant Henning, formerly assistant purchasing agent.

J. P. Nicholson has been appointed manager of the truck department of the James Levy Motors Co. of Chicago, deal-



Capt. Charles G. Percival, Former Publicity Expert and Driver, Serving with a Tank Section with the American Expeditionary Force in France.

ers in Fulton trucks. Mr. Nicholson has been with the Henry Paulman Co., distributors of Pierce-Arrow motor trucks, since 1916.

A. C. Miller, vice president of the Miller Judd Co. of Detroit, Mich., Liberty distributors, has completed a course of instruction at the Great Lakes Training Station and was commissioned an ensign in the navy.

P. L. Barter has been promoted to the post of second vice president of the McCord Manufacturing Co. He has been with the company 10 years.



G. T. Smith, President, Joseph Dixon Crucible Co., Treasurer of the United States Shipping Board, Emergency Fleet Corporation.

Fred A. Wade has resigned as purchasing agent for the Buick Motor Co., Flint, Mich. Mr. Wade's connection with the industry goes back to the old E-M-F days and later with the Metzger Manufacturing Co., leaving that for the Maxwell Motor Co., and then joining the Buick forces two years ago.

Frank Jepson has been appointed assistant sales manager of the Hurlburt Motor Truck Co., New York City. He will have charge of retail sales and sales promotion. He was formerly manager of sales promotion of the Firestone Tire and Rubber Co. of New York City.

Wesley Deem is now associated with the Lane Motor Truck Co., Kalamazoo, Mich., as production manager. He was former production manager of the Columbia Motors Co., Detroit.

C. C. Hanch has been appointed chief



C. C. Hanch, Treasurer of the Studebaker Corporation, Chief of the Automotive Products Section of the War Industries Board.

of the Automotive Products Section of the War Industries Board to succeed H. L. Horning, who has resigned. Mr. Hanch has been treasurer and a director for the Studebaker Corporation for the last three years. He will devote all of his time to the work of the board, continuing his connection with the Studebaker Corporation in an inactive capacity. Mr. Hanch is also secretary and a director of the National Automobile Chamber of Commerce.

Nelson A. Manship, associated with the Hurlburt company for the last two years, has been appointed manager of the branch at Newark, N. J.

Harold W. Evans has been commissioned a lieutenant in the National Army and assigned to the Motor Transport Division of the Quartermaster Corps at Washington. He was formerly connected with the Sheldon Axle and Spring Co., Wilkes-Barre, Pa.



Wilbur F. Reynolds, Third Vice President in Charge of Export Sales, Selden Truck Sales Co.

E. A. Bowman has sold out his interest in the Bowman-Gould Co. and has severed his connection with the firm.

Wallace C. Hood has resigned as sales manager of the King Motor Car Co. J. B. Siegfried, general manager of the King Co., has opened an office in Washington to cooperate with the Detroit factory. George C. Gurney is now in California to take the position vacated by I. B. Mears, who has recently resigned.

R. Duval Dumont has been elected vice president and sales manager of the Winther Truck Co. of New York City. He was formerly with the Motor Vehicle Bureau of the New York Edison Co., and until recently a salesman with the General Vehicle Co. Associated with him are the following: J. J. Umbach, W. H. Kelly and E. P. Risbrough.



Robert M. Barker, Director of Advertising, Sanford Motor Truck Co.

L. W. Cash has joined the E. B. Hayes Machinery Corporation, Oshkosh, Wis., as purchasing agent. He was formerly associated with the Racine Manufacturing Co.

Capt. Charles G. Percival, O. R. C., U. S. A., who is well known to motorists and the power vehicle industry as a driver, publicity and advertising expert, is now "somewhere in France" and is attached to the "Tank Section" of the American Expeditionary Forces.

Robert M. Barker, who is well known as an advertising advisor both in and apart from the power vehicle industry, has been made director of advertising for the Sanford trucks. Mr. Barker has been specializing in advertising for 18 years, his first work after being graduated from Harvard University being assistant to the advertising manager for Swift & Co., the Union Stock Yards, Chicago.



A. Duval Dumont, Vice President and Sales Manager, Winther Truck Co. of New York.

Wilbur F. Reynolds of the Selden Truck Sales Co. ought to believe in the statement that those who do their work well have responsibility thrust upon them. And the reason for this is that while he was absent from Rochester, industriously presenting the qualities of Selden trucks to the natives of other lands, the stockholders elected directors and the directors elected officers, as a result of which he became third vice president and director of foreign sales, as he was in charge of the export business.

Julian S. Friede will leave shortly for Toronto to become a cadet in the Canadian Royal Flying Corps. For two years Mr. Friede has been an important factor in the engineering department of the Paige-Detroit Motor Car Co., where his chief work has been body designing. In his new military efforts he will specialize on radio work and flying.

A. C. Burch has become associated with the Clyde Cars Co. as vice president. He recently resigned from the Signal Motor Truck Co.



A. C. Burch, Vice President and Sales Director, Clyde Cars Co.

J. C. Stiles is now associated with the Liberty Accessories Corporation, St. Louis, Mo. He was formerly manager of the St. Louis branch of the Stewart-Warner Speedometer Corporation.

J. A. Stairs has been appointed general superintendent of ordnance production at the Harroun Motors Corporation, Wayne, Mich. He was formerly vice president of the Eastern Steel Co., New Glasgow, and during the last three years has been specializing in ordnance production.

E. A. Scheu will take on the duties of president and general manager of the King Car Corporation, the New York branch of the King eight. This will be in addition to his present position as eastern district sales manager.

Adolph P. C. Schramm, formerly engineer of the Klaxon Co., is now consulting engineer at 276 Canal street, New York City.



Fred C. Henderson, New England Distributor of Clydesdale and Signal Trucks.

Overseas Service of Y. M. C. A. Needs 500 Men

Men in Various Branches of Automobile
Trade and Industry, Over Draft
Age, Are Eligible.

The Red Triangle, as the Y. M. C. A. is so well and favorably known, needs at once 500 high grade automobile men between the ages of 32 and 50 for service overseas.

Business men of character, judgment and ability, such as branch managers, sales managers, service station managers, dealers, high grade salesmen and assistants, expert automobile mechanics and service repair men, oxy-acetylene welders, radiator repair men and ignition experts, are the types of men needed.

Many are volunteering for this particular service and going at their own expense for the privilege of serving, but of course, all are not able to do this and in such cases sufficient allowance is made for the families of volunteers during their absence.

There are nearly 700 Red Triangle buildings, huts and dug-outs in France from the base of supply to the front line trenches, and many of these are moved with the army, and this means quick, prompt work on the part of the Motor Service Department. Every hour brings new problems. Men who can think and act quickly, with initiative, tact and ability to keep the cars moving are the type of men most valuable. Next to serving in the army, probably the greatest opportunity in a life time comes to men who have the privilege of serving in this department of the Y. M. C. A.

Information as to details for overseas motor service can be secured from the War Personnel Board of the Y. M. C. A., 347 Madison avenue, New York City, or through the local or nearest Y. M. C. A. secretary.

CONSERVING GASOLINE IN THE RED CROSS OVERSEAS SERVICE.

Gas consumption in France, at least on American Red Cross Ambulances in Europe, is measured by blocks to the liter rather than miles to the gallon. Gas or "essence" is a precious article in the war zone and not at all easy to get; in fact, almost impossible to buy for cash. Fortunately the gas stations maintained by the French and American armies cooperate with the American Red Cross Motor Service and allow ambulances and trucks to obtain limited quantities of gas on "carnet" or triplicate orders supplied to Red Cross drivers. Any gas obtained from a French station, however, is merely borrowed and the Red Cross must return it liter for liter from stocks reaching it at the various ports. The official orders filled from American army stores are redeemed in cash. The French, however, will not part with their

gasoline for money.

With gasoline, as well as motor equipment so precious, the Red Cross has instituted unusual gas saving measures governing its entire fleet of 634 ambulances, trucks and other gas vehicles. Carburetor adjustments receive unremitting attention. No car is allowed to continue to run with leaking valves or any other defect which will lower its "blockage" per quart, or waste oil. No chauffeur who is not expert in getting maximum "blockage" remains long at the wheel. Every chance of joy riding is eliminated by a system which well might be adopted by owners of pleasure cars and trucks of the United States.

No car leaves the garage even for a trip of four blocks until the odometer reading is taken carefully and gas in the tank or in reserve cans measured accurately. The driver starts out with a trip card registering all these facts and new readings are taken on his return to the garage or on his arrival at the next Red Cross motor transportation station. If his odometer shows that he has deviated from the shortest path between the garage and his objective, or if his time indicates that he has been delayed, he is called upon for an explanation. A doubtful excuse brings a sharp warning; a second offense puts him on the "wash rack," washing dirty cars for several days. As all Red Cross drivers are militarized he has to take his medicine. A third offense may send him to the provost marshal of the American army in Paris as a military offender. Various punishments are meted out, but the most feared of all, they say, is an order that the man be separated from the Red Cross and sent back to America in disgrace.

SINGER AUTOMATIC SIGNAL.

It is interesting to study the various methods of signaling that are adopted by automobilists in congested traffic. No two drivers seem to employ the same identical gestures as signals. A hand thrust forth from the driver's side in such a manner that it may denote a stop, a

turn to the left or a turn to the right. Doubtless many accidents would be averted if a universal signaling system were in vogue.

The Singer Auto Traffic Signal, which has been manufactured for some time, is designed to prevent traffic confusion and provide a suitable signal which is positive in action and easily interpreted.

The device consists of two electrically lighted boxes, one at the front of the car and the other at the rear, in which are carried five signs. Ahead, Right, Left, Stop and Back. These signs are controlled by a circular switchboard located on the steering column directly beneath the wheel.

When the driver of the car wishes to stop he simply presses the stop button and the signal "Stop" appears in both boxes. This same signal is automatically displayed upon application of the service brakes. The other signals are operated in like manner and as all buttons are interlocking, but one signal can be displayed at a time.

This signal is manufactured by the Singer Auto Traffic Signal Co., 2827 Locust St., St. Louis, Mo. Literature describing the device in detail and price list will be mailed upon application.

LOUIS CHEVROLET WINS THE FOURTH ANNUAL CHICAGO DERBY.

Louis Chevrolet in a Frontenac, driving 100 miles without a stop or accident at the rate of 108 miles an hour, won the Automobile Derby Handicap at the Speedway Course, Chicago, on June 22. Ralph Mulford in another Frontenac and Ira Vail in a Hudson finished second and third respectively.

Dario Resta, De Palma and Arthur Duray, the latter the European champion, all favorites, made a disappointing race. In the 40th mile Resta quit with engine trouble and De Palma finished in eighth position. Duray was still circling the track when most of the crowd had gone home.

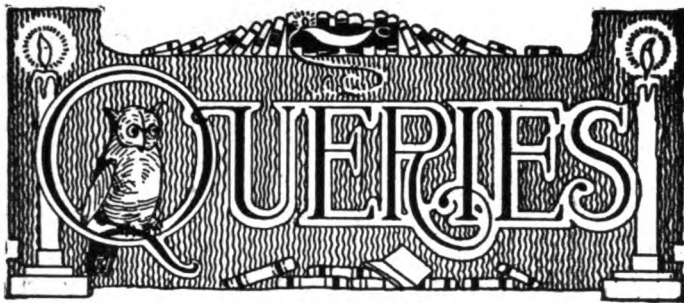
Chevrolet's time was 55:29.60; Mulford, 57:07.20; Vial, 58:14. Before the 100-mile race Ralph De Palma made a new world's track record for cars of 300 cubic inch displacement, circling the oval in his Packard in 1:20.41, an average of 115.3 miles an hour. The previous record of 113.2 miles an hour was established by Resta four years ago.

CHALMERS AND MAXWELL DISTRIBUTORS COMBINE.

The combination of the C. E. Fay Co., Boston distributors of Maxwell passenger cars and trucks and of the Chalmers Motor Co. of New England, Chalmers distributors, has just been announced. This is one of the largest deals accomplished in New England and is directly in line with the urgent suggestion of the government that motor car dealers concentrate their efforts insofar as possible to the end that their affairs may be conducted at less expense and greater efficiency.



Showing the Singer Signal in Use.



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

WHAT ARE THE BEST METHODS EMPLOYED IN RE-PAINTING AND REFINISHING THE CAR?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the issue in which the question appears. Answers to the question should be in the hands of the editors by the 18th of July. The contest is open to every one.

QUESTION: WASHING AND POLISHING THE CAR.

(C. S. Barningham, Providence, R. I.)

Best Letter.

The engine of a car can be mistreated frequently before it begins to complain. The finish of a car can be mistreated once or twice and then there is no finish to mistreat. The lack of washing and the essential knowledge of not knowing how to wash a car will go further towards ruining the appearance than any other thing. The varnish of a new car is benefited and hardened by continual washing with clear cool water. Mud that is allowed to dry upon the car draws the oil from the varnish and leaves the finish mottled and streaky. Dirt is not the only enemy for gases from the garage and even the atmosphere of some towns attack the finish of the car that is not frequently washed.

Begin by cleaning the top. Take a good stiff brush to remove the dust and then either sponge it or use a soft cheese cloth with warm water and pure soap, castile preferred. A chamomile kept especially for the purpose will tend to hasten the drying, but the top should not be folded until it is thoroughly dry. The upholstery, if of cloth, is best cleaned by sponging with water containing a little salt and alcohol. If of leather a woolen cloth dipped in clear water to which a few drops of ammonia has been added is best.

In cleaning the body be sure to remove the nozzle of the hose and flow the water over every part of the body. This will serve to wash as much of the dust off as possible and also loosen the mud. In cases where the car is very dirty it is best to let it stand for 15 minutes and then go over it again with the hose, which generally will take off the most obstinate cases of hardened mud. Take a soft, clean sponge and follow the hose over the body. If certain portions are grease spotted these should be washed separately with pure water

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Don't Let Your Brakes Drag

LOST power from dragging brakes is usually due to neglect of brake rod bushings.

Lubricate these out-of-the-way bearings with



and you will save the power wasted by dragging brakes and keep them more responsive. Less cost per month for better lubrication is the result of using NON-FLUID OIL on every gear and bearing.

Ask your dealer for the orange can with the sprocket wheel trade mark—get "KOO special" grade for gears. "K000" for bearings.

New York & New Jersey Lubricant Co.

165 Broadway

New York

Hotel Winton

You'll enjoy yourself better when in Cleveland if you stop at The Winton, the Newest and Finest Hotel in the city.

600 ROOMS 600 BATHS

\$2 00 Up.

To be complete your trip must include a visit to the

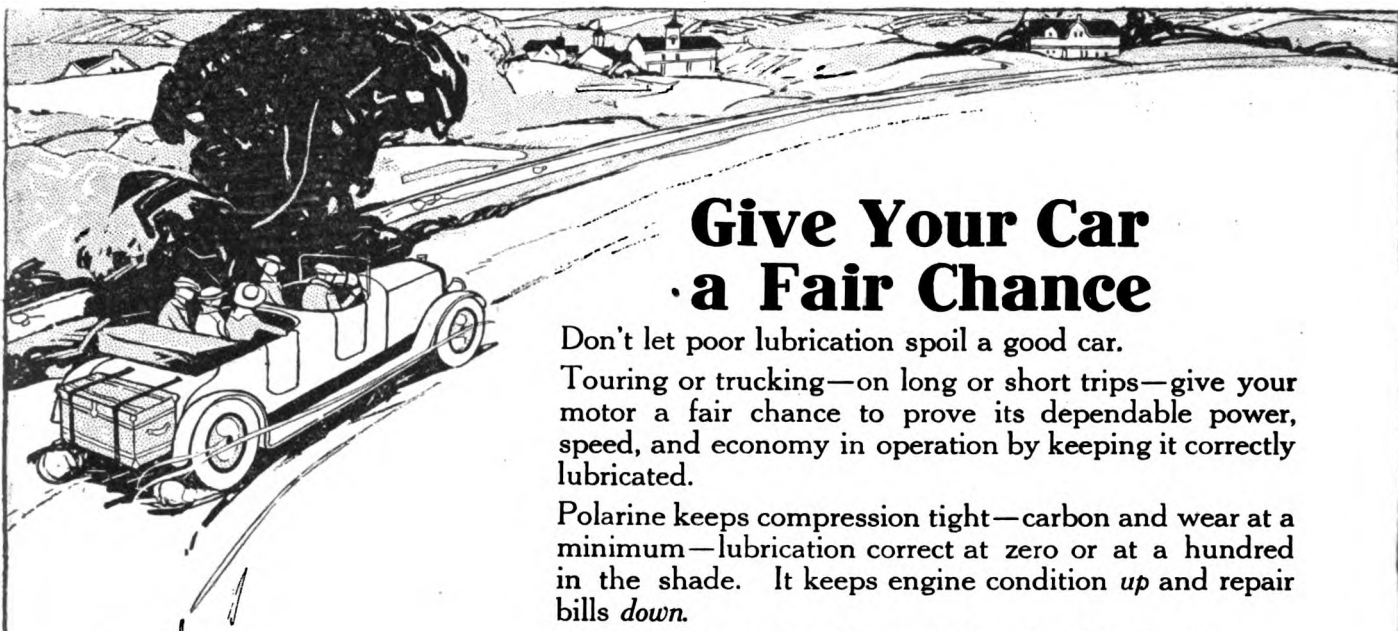
ICE RINK CARNIVAL

in the famous Rainbow Room.

Hotel Winton

C. M. SNYDER, Managing Director
Prospect Ave. at East Ninth
Cleveland





Give Your Car a Fair Chance

Don't let poor lubrication spoil a good car.

Touring or trucking—on long or short trips—give your motor a fair chance to prove its dependable power, speed, and economy in operation by keeping it correctly lubricated.

Polarine keeps compression tight—carbon and wear at a minimum—lubrication correct at zero or at a hundred in the shade. It keeps engine condition *up* and repair bills *down*.

Look for the Red, White and Blue SO-CO-NY Sign.

STANDARD OIL CO. OF NEW YORK

NEW YORK ALBANY BOSTON

BUFFALO



POLARINE

and castile soap, but except in this one instance soap of any kind should not be used on any part of the body or mud guards.

The road oil and grease that collects on the running gear require different means of its removal and in addition, separate tools. Special brushes will get at grease in inaccessible places and a hard and fast stream of water should be used to advantage, but must be slanted at all times. When thrown against the wheel hubs care should be taken to avoid water working into the bearings. The chamolis used on the body should never be used on the running gear. A separate chamolis should be kept for this purpose.

A heavy dust deposit should never be taken off by dusting. It should be made to flow off. A hard wax should be preferred to a liquid polish as the former leaves a coating over the varnish through which rain nor moisture cannot penetrate.

Take care to protect the upholstery and finish of the car by leaving it in the shade of a tree or building when in use, as this will automatically protect the finish and also the tires. Exposure to the glaring sun is to be avoided and observing this precaution in addition to those set forth above, one will add to the economical operation of the car, as well as to preserve the luster of the finish and the softness and pliability of the upholstery and top.

WASHING AND POLISHING CAR.

(R. L. Prindle, No. Abington, Mass.)

It appears to many car owners that washing an automobile requires but little skill. When, as a matter of fact, as much skill is required in doing this sort of work, for the most highly finished body may be ruined and have that dull and satin appearance due to improper washing.

The finish on a new car that is put on at the factory requires several months to harden, due to the large number of color applications, and the final coats are varnished. The color applications are anywhere from 10 to 22. This being the case, great care is imperative in order to preserve this

deep luster, and its greatest enemies are mud, dust, road oil, spots, sun, grit and dampness.

A dirty car should not be allowed to remain so more than a day, especially if the mud deposited on the body and running gear is at all heavy. The longer the body remains spotted the more difficult it will be to remove the spots and restore the luster. It is even recommended that dust which accumulates on fenders, hood and panels be washed off rather than dusted off.

The water used in washing the car should be neither too cold nor too warm, the ideal temperature is about 50 degrees Fahrenheit, or the same temperature as the atmosphere. Before any washing is started the hood should be raised and the engine covered with a piece of canvas or heavy paper in order to protect the electrical apparatus from water, which is very apt to enter from the radiator and through the openings in the side of the hood. On early model cars this is not necessary.

In washing the car body clear water, a clean pail and two large sponges are necessary, one for the body and one for the running gear. A neutral soap, obtainable at any automobile supply house must be had, as ordinary soap cannot be used, as it will dull the varnish. A piece of chamolis about 12x18 should also be included in the washing equipment. Begin by turning a light stream from a hose on to the body. Continue to do this until all the dried mud has been loosened and the bulk of it washed off. With the body sponge work up a good lather in the water and soap in the pail and go over the body thoroughly, and then rinse off the soap and all the remaining moisture can be taken up with the chamolis, which is first wrung out in cold water. Care must be taken not to allow grit to get into the chamolis, which should be wrung in fresh water continually. There remains the running gear to clean and parts such as axles, knuckles, springs, etc. The parts that are greasy should first receive a kerosene bath with a stiff paint brush, afterwards being wiped dry with a cloth or waste.

If this is not done the sponge will become filled with

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Would You Run Your Car With the Brakes Dragging? Certainly Not.

Yet most roller bearings have a brake which prevents the rolls from turning freely, naturally causing friction. This useless part is called a "cage" and is used to hold the rolls in position. Beside the braking action on the rolls it takes up room in the bearing.

The Wright Taper Roller Bearing is the only taper roller bearing which does not have this unnecessary and troublesome part. Its design is fundamentally correct, making this cage unnecessary, and in the space gained by its removal are used more rolls, increasing its capacity nearly 50 per cent. over other roller bearings of the same size and adding thousands of miles to its wear-resisting capacity.

The rolls support the load and reduce the wear. The more rolls, the less wear on each and the less weight each has to carry.

Look at the cuts and the diagram, then ask your dealer to show you the only "cageless" taper roller bearing made for Fords.

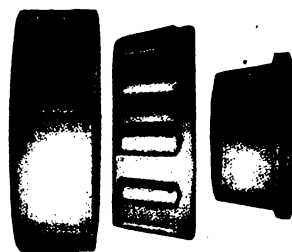
Dealers: Ask your Jobber or write us.

NATIONAL BEARINGS SERVICE CO. WRIGHT TAPER ROLLER BEARINGS

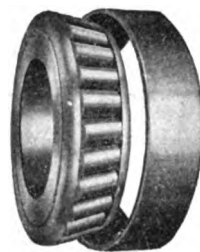
Replacements for all Standard types of Bearings

1410 Girard Ave., Philadelphia.

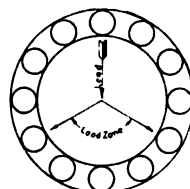
16 West 62nd St., New York.



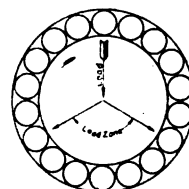
Average Type.
Note the cage (center of cut) and count the rolls.



Wright Type.
Note absence of "cage." Count the rolls.



VARIOUS TYPES
(AVERAGE NUMBER OF ROLLS, 12)



WRIGHT TYPE EXCLUSIVELY
(AVERAGE NUMBER OF ROLLS, 18)

Price, \$10.00 per set
(4 Bearings)

In Canada, \$15.00

Fits Chevrolet 490 Also

grease and therefore it will not be possible to clean with it. This done turn on the hose to loosen up the mud, after which the running gear is gone over as stated about the body. The car should never be washed while the engine is hot, as this would cause the finish on the hood to crack and chip off. To preserve the car's finish some good standard wax or liquid may be applied, the former being best applied by making a pad of several thicknesses of cheese cloth and the wax placed inside to work itself through upon application and enable one to put on a more uniform coating and a better finish. While the latter is generally put on by spraying, in every case it is polished by soft cheese cloth or flannel.

For the removal of spots caused by road oil or tar, a cloth may be used dipped in gasoline. There are, however, preparations on the market to accomplish this end, and processes of removing chemicals which are safer to use if one is in fear of injuring the body finish by the use of gasoline. The writer recommends wax as means of preserving the finish, as this produces a glass like surface through which oil or dust, as well as rain, cannot penetrate.

WIRE WHEELS ON SCRIPPS-BOOTH CAR.

(J. N. C., New Haven, Conn.)

Will you please inform me how I can remove the Houk wire wheels from my Scripps-Booth car. The gears which are on the wheel shafts do not mesh with the little gears in the differential by 3/16 of an inch. Is there any adjustment that will make them mesh more closely? There seems to be a rattle between the transmission gearset and rear axle when the car is being started and in changing gears. Would this be caused by the lost motion in the differential?

After jacking up the car until the wheel is free from the ground, being sure that the jack has a firm foundation, examine the hub and find on the side of the hex nut the word "on," with arrows indicating which way to turn, as both right and left hand threads are employed. With the wrench turn the nut in the proper direction, but this cannot be turned un-

(When Writing to Advertisers, Please Mention The Automobile Journal.)

less the wrench is slipped well over the nut to push down the ratchet catch, which is arranged on one face of the nut. On removal of this nut the wheel may easily be slipped off.

As there is no adjustment for the differential gears, we would suggest that you insert either a thin brass or bronze washer over the gear hub, between the gear and the differential housing. This will cause the gears to fit more closely together.

The rattle you complain of is probably due to the lost motion in the differential. The universal joint may be worn or loose on the shafts. When you remove the differential throw in the high speed and by reaching into the differential housing you can determine the play by turning the pinion gear back and forth.

TROUBLE IN THE MUFFLER.

(H. B., Chicago, Ill.)

I am having a lot of trouble with my car recently. It seems to have little power except when the muffler cut-out is open. The engine seems to act all right when the cut-out is open, but I again experience the lack of power when it is closed. Does the opening of the cut-out add to the power of the engine?

This trouble is undoubtedly due to an obstructed muffler. This, perhaps has become partially filled with carbon from the exhaust gases which pass through it. Suggest that you remove the muffler and disassemble it to scrape out the deposits. After reassembling with the muffler clean and unobstructed you will find that there is little difference between an open and a closed cut-out. It may be possible for you to dislodge most of the carbon deposit by gently tapping the walls of the muffler while it is attached to the car with a wooden hammer and while the engine is running, as this will have a tendency to blow out the carbon. This portion of the car should be cleaned at least once a year and perhaps twice a year if you wish to get good results from your engine.

POWER

FROM PISTON RINGS



Pat. March 2, '15; Feb. 29, '16

Good oil engineers have found that 80% of the excess oil and unburned gases pass around and behind reciprocating piston rings. The result is lost power and excessive carbon.

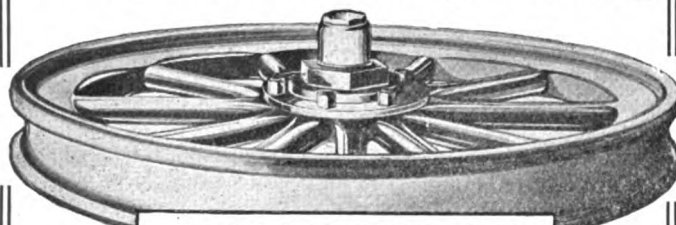
Pressure Proof Piston Rings

cannot reciprocate. The spring expander automatically takes up any excess in the ring groove. All possibility of either oil or gases passing between the cylinder walls and the piston is overcome. This is why Pressure Proof Piston Rings permanently eliminate carbon and restore maximum power.

Write for "New Facts About Piston Rings" and special dealer proposition

PRESSURE PROOF PISTON RING CO.
168 Massachusetts Ave. Boston, Mass

The Quickest Tire Change on Earth



MINUTE WHEEL
DEMOUNTABLE



Made for Ford Cars by HILL-SMITH METAL GOODS CO., Boston. Backed by H-S Trade Mark of Quality.

Tarvia

PREVENTS DUST PRESERVES ROADS
Booklets on request

THE BARRETT COMPANY

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh Detroit Birmingham Kansas City Minneapolis Nashville Salt Lake City Seattle Peoria



DIXON'S
GRAPHITE
Automobile
LUBRICANT

Practically every noted racing driver uses Dixon's. The selected flake graphite gives a superior lubrication that prevents wear. It will rid your car of friction as it does the racing drivers. Booklet No. 210-G.

Made in Jersey City, N. J. by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827



REBABBITTING FORD CONNECTING RODS.

(F. Mac V., Syracuse, N. Y.)

I have had trouble with babbit in the lower end of my Ford connecting rods, which resulted in the latter becoming loose. I have exchanged these rods for new ones and after running the new ones a short time have found one of the new set is loose. These rods were babbitted at the factory, so should be O. K.

Please advise me the reason of this.

In babbitting the rods is it necessary to make any special preparation for causing the babbit to adhere to the steel? Any advice will be greatly appreciated.

The bearing linings on the Ford connecting rods are retained in the seat of the casting by stubs or bosses that hold positions near the edge on either side. These holes are one-quarter inch in diameter and about 3/16 of an inch in depth, at angles to the dividing lines, and the bosses of the linings when poured into the seats practically fill them. The linings are securely anchored in this way.

It is not advisable to attempt the rebabbing of the connecting rods without a special jig in which to form the bearings, as satisfactory results cannot be obtained.

Suggest that you return these for exchange to the nearest Ford agent, the charge probably being about 75 cents per rod for rebabbing.

TROUBLE IN ELECTRICAL SYSTEM.

(W. M., Lawrence, Mass.)

The Auto-Lite system, six-volt circuit breaker, on my model 83 Overland car recently gave me a little trouble in that it did not break the circuit and would have allowed my battery to discharge through the generator. Although my book of instructions says not to meddle with the circuit breaker, I took a chance and changed the tension of the two springs that govern the lower contact point, which seemed to overcome this difficulty. Since then very often it will not close the circuit when the car is traveling at a good rate of speed and while I again changed the tension of the springs, I probably do not change it just right. Seeing almost everything pertaining to overhaul in the Automobile Journal, I thought perhaps you might suggest something to help me overcome this trouble.

As evident from your letter the circuit breaker on your Overland is badly in need of adjustment and the only practical suggestion that we can offer in this particular case is for you to return this instrument to the factory, where they have special apparatus for repairing same.

When removing it from the car be sure that a short piece of bare copper wire is firmly attached from the wire terminal post of the generator to one of the brass screws in the name plate.

INFORMATION ON HOLMES AIR COOLED CAR.

(C. L. R., Spanaway, Wash.)

How big a car is the Holmes Air Cooled Automobile? Where can I get a complete list of the specifications of all automobiles manufactured?

A six-cylinder engine is used on the Holmes car, having 3 1/2 inch bore by 4 1/2 inch stroke and a rated horsepower of 29.4. Gas is fed to the Newcomb carburetor by the Sparton vacuum system. Valves are overhead and the cooling system is practically like that used in the Franklin. Engine, clutch and transmission are assembled in a single unit. The deep seated, balanced crankshaft is fitted with seven bearings. Force feed lubrication and there are oil leads to each main bearing and one to the timing gears, eight leads in all. The crankshaft is drilled, carrying oil to the connecting rods and oil sprays from the connecting rod bearings to lubricate the pistons. The new type of Eisemann magneto supplies the ignition and an automatic advance and retard is controlled by a built-in governor. Starting and lighting is by a single switch used in the Dyneto single unit system. The clutch is of the multiple dry plate type. Brown-Lipe transmission with Timken roller bearings on the main shaft. The frame is of carbon steel, deep section, and is tapered at the front to give

(When Writing to Advertisers, Please Mention The Automobile Journal.)

a short turning radius. The equipment includes electric horn, speedometer, ammeter, clock, spotlight, work lamp, tonneau lamp, door curtain rods and tool equipment. The weight is 2800 pounds and price \$2550 f. o. b. Canton, O. The manufacturers will put you on their list for a catalogue to be mailed as soon as completed should you care to write them.

Complete specifications of all cars was reviewed in our December 25th number of the Automobile Journal.

TWO AND FOUR-CYCLE ENGINES.

(G. A. D. A., Providence, R. I.)

Kindly let me know the proper answer to the following question. What is a two-cycle engine and a four-cycle engine?

The two port or two stroke cycle engine performs the operation of inlet or suction, compression, explosion and exhaust in one revolution of the crankshaft instead of in two revolutions, as in the four-cycle engine.

This engine has no mechanically operated valves or valve operating parts, the only moving parts of the engine being the piston, connecting rod, crankshaft and a suction operated valve.

Any series of events that happen in regular order and then repeat in the same order is called a "cycle." The four strokes of the engine form a cycle and this type of engine is called a "four-cycle engine."

There is only one power stroke out of the four strokes of the piston, that is, the crankshaft and the flywheel turn twice around for one power stroke. The first full turn of the crankshaft makes the piston go out on the inlet stroke and back on the compression stroke. The second full turn of the crankshaft lets the piston go out on the power stroke and back on the exhaust stroke.

The four strokes of the engine consist of the inlet, the compression, the power and the exhaust, and these strokes are repeated again and again as long as the engine runs.

TIMING THE CHANDLER 1916.

(W. H., Cranston, R. I.)

Could you kindly inform me through the columns of the Automobile Journal how to set the timing gear on a model 1916 Chandler car. I do not see any mark upon the crankshaft or upon the camshaft gear. I forgot to mark the gears in disassembling.

The firing order of the Chandler engine is 1-5-3-6-2-4. The inlet valves are numbered 2-4-6-8-10-12, and the exhaust valves 1-3-5-7-9-11.

The exhaust valve is timed to close $1\frac{1}{2}$ inches past dead center on the suction stroke and the inlet valve opens $1\frac{1}{2}$ inches past dead center on the same stroke.

To check the setting of the camshafts the punch marks on both sprockets will line up with the sprocket center. The marks you cannot locate will be found on the edges of the sprocket nearest one another.

(Continued from Page 17.)

Adjustments of Brakes.

When brakes will not "take hold" readily it is not always necessary to renew the lining or that they need adjusting. Oil or grease may have accumulated on the friction surfaces and if such is the case, wash off the grease and dirt with gasoline or kerosene. As brake linings become worn the brakes should be immediately adjusted. Failure of the brakes to hold securely may be due to insufficient forward travel of the rods connecting the brakes with the foot pedal or hand lever. Dragging of brakes may be due to insufficient backward travel. The remedy for this trouble is by lengthening or shortening the rods (see illustration of brake rods assembly). Until after adjusting the rods no adjustments should be made in the brakes themselves.

The operations of adjusting the brake bands are as follows: Place jacks under the rear axle, being careful to have them press up against the housing proper, or on some Timken axles against the pads made for this purpose, but never against the truss rods. Raise both rear wheels off the ground.

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REAR VIEW

Note that the Smith Auto Signal shows to the front to the traffic policeman as well as to the rear.

SMITH SIGNAL CORPORATION,

Manufacturers

WEISS & SINCLAIR, U. S. Distributors

53 West 66th Street

NEW YORK

Don't Wait Until Afterwards

How easy it is for the "other fellow" to smash into you, wreck your car and then if you are lucky enough to be alive have him tell you that he did not see your hand. Prevent the accident by providing your car *now* with the

SMITH AUTO SIGNAL

This signal eliminates hand signaling and tells definitely, positively and unmistakably what you are going to do. The burden of proof is then on "the other fellow."

Don't wait until afterwards.

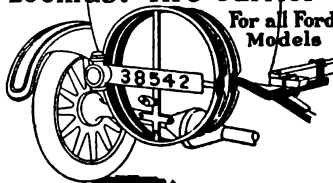
Write to-day.



LOCKFAST TIRE CARRIER FOR ALL FORD CARS

Lockfast Tire Carrier

For all Ford Models



Positive and Economical Insurance Against Tire Thieves.

Strong! Attractive!

Type A - For One Tire \$5.50

Type B - For Two Tires \$7.00

Type C - For One Demountable Rim \$5.50

Manufactured and Guaranteed by

THE LOCKFAST MFG. CO., Cleveland, Ohio.

Liberal Discounts to Jobbers and Dealers.

CHAS. M. S. FOSTER, Sales Director.

243 Columbus Ave., Boston, Mass.

Represented by

Gray Heath Co., Chicago, and Geo. L. Holmes, New York.

THE MOTOR TRUCK

Published Monthly

The year \$2; the copy 20c

A magazine for business men devoted to the promotion of highway haulage efficiency. It is the national authority of vehicular transportation.

AUTOMOBILE JOURNAL PUB. CO.

Times Building

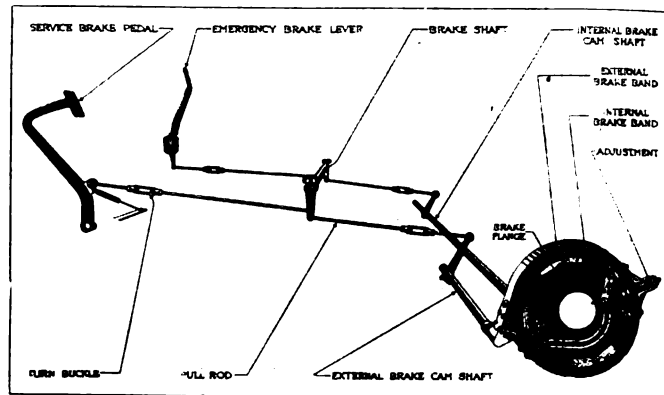
Pawtucket, R. I.

**NEW DEPARTURE
BALL BEARINGS**



Strength
Stamina
Service

The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensee



Buick-Mott Brakes as Example.

Example, Buick-Mott brakes: The external brakes are the service brakes and are operated by the right pedal in the driving compartment. When in the free position there should be a clearance of 1/16 inch between the brake band (note adjustment nut in brake assembly illustration) and the brake drum all around. The clearance may be adjusted to take up wear by shortening the pull rods between the brake shaft and the brake camshafts by means of the turn buckles, and clearance may be kept uniform around the entire circumference of the drum by means of the adjusting screw at the rear of the bands. Care must be taken to see that brakes on both wheels are adjusted alike. Adjustment of the pedal position is made by means of the turnbuckle in the pull rod between the pedal and the brake shaft. The brakes should be set so that they can be applied by a slight pressure on the pedal, but the brake bands should not rub on the drums when pedal is released.

The emergency brakes are the internal brakes and are operated by the hand lever. They are not very frequently used, hence wear very slowly, but when necessary can be taken up in the same manner as the service brakes, by ad-

**ZENITH
CARBURETOR**



KNOWN the world over as the zenith of carburetor efficiency. A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.
New York Detroit, U.S.A. Chicago

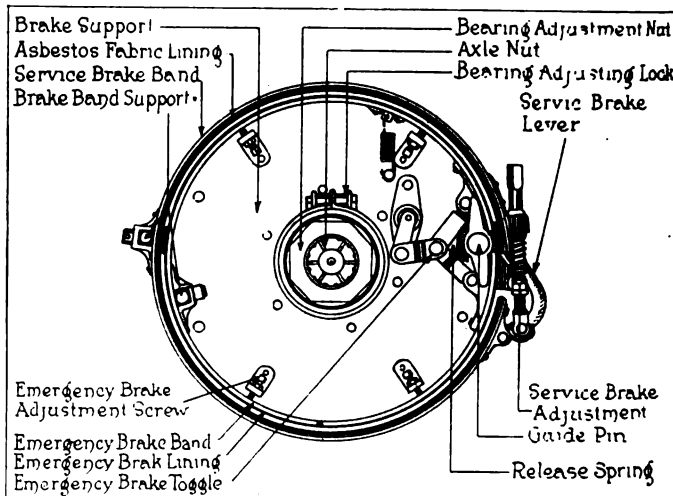
Ask For The Best Wrench

Your dealer will show you just the size you need for your tool kit, or for repair work.

He will recommend the COES wrenches as all good dealers have done for fifty years.

Coes Wrenches do not break, or wear out in service life, they cost less than any other tool made.

COES WRENCH CO.
WORCESTER, MASS.



Chalmers-Timken Brakes as Example.

justing the length of the pull rods. Adjust so that both brakes are applied equally when lever is pulled.

Chalmers-Timken brakes as example: The service brakes are external contracting bands on the brake drums of the rear wheels. These steel bands are lined with asbestos fiber. All ordinary adjustments of these brakes are made by means of a lock nut adjustment at the front of the brake band. The steel bands can be relined when necessary by cutting off the old rivets and applying new lining.

The emergency or hand brakes act on the inside of the brake drums. They are of the internal expanding type and are lined with asbestos. The adjustment is made by drawing in or lengthening the two brake pull rods by means of a threaded "brake" pull rod adjustment. In adjusting brakes, care should be taken to see that both brakes of the same set are adjusted evenly, so as to apply the same resistance to each of the rear wheels.

Giant Searchlight

The highest quality lowest priced lamp produced

LIST PRICE	With Mirror	\$6.00
	Without Mirror	\$5.00

Sold by all dealers

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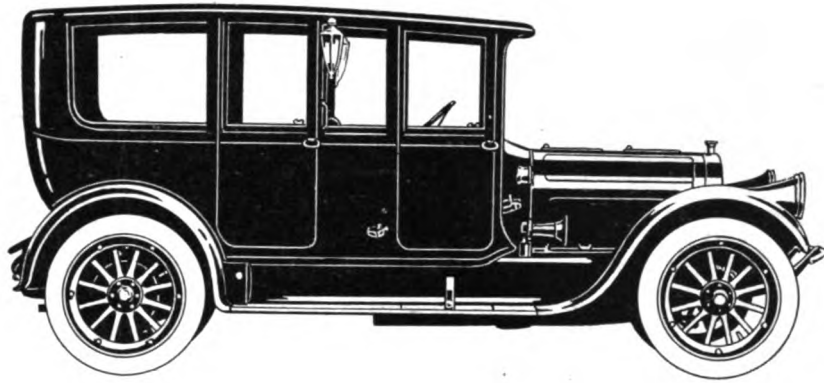
PAIGE

It is a well-known fact that Paige Dealers are among the biggest money makers in the motor car field. An inspection of the Paige line will explain why.

Write for complete particulars

PAIGE-DETROIT MOTOR CAR CO., Detroit, Mich.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



The Pierce-Arrow Vestibule Suburban is 6-cylinder, 48 horsepower and 142 inches wheel-base. It is a roomier car than the Vestibule Brougham. As its name suggests, it is designed especially for country life, for meeting guests at the station and carrying comfortably larger parties than the other types of enclosed cars.

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Every Pierce-Arrow assures a permanency of service and of dependable service.

THE PIERCE-ARROW MOTOR CAR CO.

BUFFALO, N. Y.

Mossberg

**ALL
STEEL** **WRENCHES
AND TOOLS**

Why Your Customers Want Them

Behind Mossberg All Steel Wrenches and Tools stands Mossberg national advertising—an assurance to every dealer that a new and unusual demand is continually being created for this dependable line.

Persistent advertising to all classes of wrench and tool users makes Mossberg Tools constantly called for. In so much as the Mossberg line includes so many specialties in adjustable, socket, single and double-end wrenches, made particularly for "the places hard to get at," there is a model for every need or requirement.



MOSSBERG
DEPENDABLE TOOLS



Series
"K"
Adjust-
able
Wrench

are to be consistently called to the attention of your customers in such publications as Saturday Evening Post, Literary Digest, Hardware Age, Hardware & Metal, Motor World, Motor Boat, Implement and Tractor, Commercial Car Journal, Motorcycling and Bicycling, Motorcycle and Bicycle Illustrated, Automobile Trade Directory and American Exporter, reaching every class of possible customers for Mossberg Tools.

You will get the full benefit from our national advertising by letting your customers know that you are the Mossberg dealer for whom they are looking, and incidentally get quick turnovers—a number of them. Use our free dealer helps to do this.

We have an interesting story to tell you on the Mossberg proposition, and how it will bring an increasing number of satisfied customers to your store.

"Our simple sales policy is to deserve your business."

Send for 201-E descriptive catalogue.



No. 14 Socket Wrench Set

FRANK MOSSBERG COMPANY
Wrenchsmiths for Twenty Years **ATTLEBORO, MASS.**

AUTOMOBILE JOURNAL

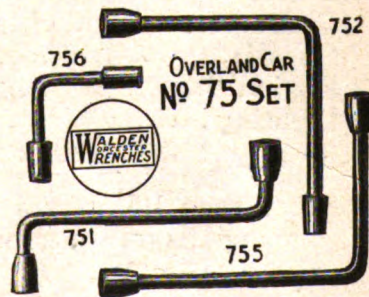
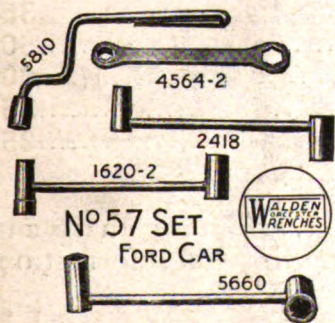
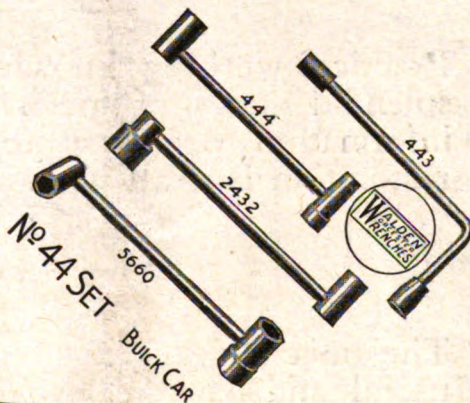
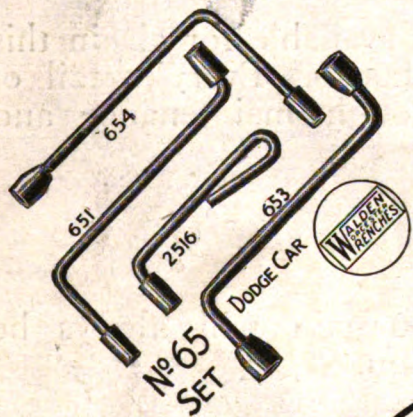
DEVOTED TO

OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS

VOL. LXV.

PAWTUCKET, R. I., JULY 10, 1918.

NO. 11.



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RELEASE MECHANICS

Now usefully, but not essentially employed, for

WAR WORK

By adjusting and repairing the automobiles you drive.

Practical working knowledge is available for all in this splendid series of mechanical books. Every detail of information necessary for thorough maintenance and restoration is dealt with.

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More than 1000 pages of text, 2000 illustrations in these books, including charts and working diagrams, completely indexed. An encyclopedia of mechanical information.

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Automobile Journal Publishing Company

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But right now it is better than ever before, because the special advertising drive which Michelin has started in New England means increased business and profits to all Michelin's New England dealers.

If you, Mr. Dealer, want to handle a tire that embodies unsurpassed quality and sells at reasonable prices, and if you want to get in on the ground floor of the unusual opportunity offered by the Michelin drive—then write or wire us today.



MICHELIN TIRE CO.

of Massachusetts

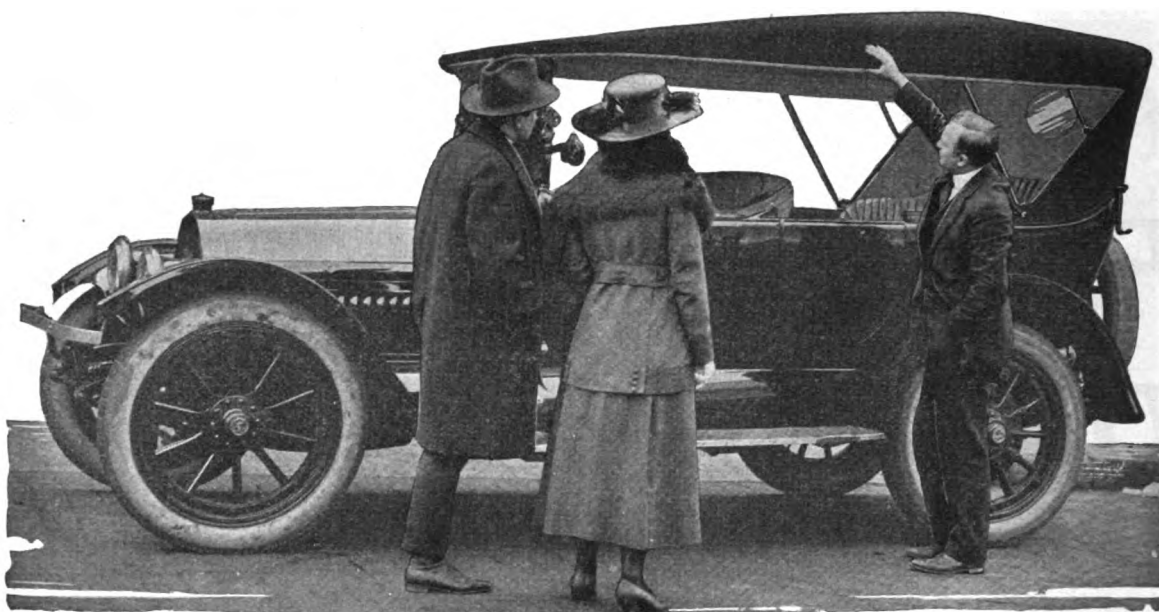
901 Boylston Street, : : Boston

Factory: Milltown, N. J.

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DU PONT AMERICAN INDUSTRIES



RAYNTITE FABRIKOID—The Tip-Top Top

Thousands of cars look old and seedy because of dingy, faded, leaky tops. If your car is in this class why not have your local top maker restore its snappy appearance and give it enduring serviceability by putting on a new, beautiful top made of Rayntite Fabrikoid.



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RAYNTITE

is made to stand heat, cold, rain and snow without losing its fresh appearance. We specifically guarantee it for one year not to leak, crack nor peel—but it's made to last the life of the car. Why not end your top troubles once and for all with a top backed by a Du Pont guarantee. Check Rayntite in the coupon. Send for free sample and tell us the best top maker in your locality.

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World's Largest Manufacturers of Leather Substitute
WILMINGTON DELAWARE
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When a car becomes dull because the original varnish has lost its lustre, a coat of PANVAR will make it bright and the finish as lasting as the day it left the factory. Because your car has a dull, shop-worn look it does not follow that it needs an expensive repainting job. If the paint is good, all it needs is a final coat of PANVAR.

PANVAR has qualities not found in varnishes. PANVAR is as thin as water, so anybody can "Flow it on" from a wide brush. Being "self-levelling" it will not show streaks or brush marks. It is transparent so it can be used over any color.

PANVAR, when applied to the plated parts, adds to their life and preserves the shine. On the leather seats, and imitation leather, too, it is fine. It makes leather last longer and does not stiffen it, nor will your clothes stick to the seats on hot days. It helps the tops also—they become more

water-proof after PANVAR has been applied. PANVAR will not crack, peel or craze, show flaky or turn white.

PANVAR DRIES OVER NIGHT

One quart will do an average car. Price at all live dealers is \$1.50 a quart, 4 quarts for \$5.00.

THE GREATEST FEATURE WE CLAIM FOR PANVAR IS that with PANVAR you can refinish your car yourself and know it will be a good job—it's amazingly easy to apply. The finish lasts as long as it would with a costly varnishing job.

THINK OF IT—APPLY TONIGHT AND RIDE AS USUAL TOMORROW—but in a nice, bright, new-looking car.

Should your car need repainting, insist on a coat of PANVAR being first applied as PANVAR IS ELASTIC and paints are not—so a coat of PANVAR FIRST, as an undercoat, will help hold the paint together. PANVAR IS EQUALLY AS GREAT AS A PRIMER OR FINISH.

SEND \$1.50 FOR A QUART OR \$5.00 FOR 4 QUARTS (DELIVERY CHARGES PAID TO ALL U. S. POINTS)

or send 10 cents for a sample if you wish to try PANVAR before ordering.

(It is guaranteed to do what is claimed for it.)

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Pacific Coast Offices: 528 Monadnock Building, San Francisco, and 601 Luckenbach Building, Los Angeles
CHARLTON B. PERKINS CO., Managers.

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Rush by express, all charges paid, one dozen quarts PANVAR, including twelve samples and advertising matter, for which I enclose money order for \$12.00.

Firm name.....

Address

By

Those ordering from points over 2,000 miles from Philadelphia send \$1.00 additional.

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Please send by express or parcel postpaid.....quarts

Please send by mail sample for enclosed 10c.

Name

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Send check or money order unless known to us.

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Motor Oils Gear Oil



EAGLEINE MOTOR OILS

*Contain the Greatest Viscosity
with Carbon Almost Negligible*

They Are Thoroughly Refined Under Our Own Special Analysis.

Constantly Use Eagleine Motor Oils

Your Confidence in the Efficient Lubrication of Your Motor Will Then Be Supreme. You Will Start to Save and Not to Waste.

Eagleine Motor Oils Are the Purest—

They contain only the essential lubricating properties of the natural oil, with all the impurities extracted.

Eagleine Quality has been proven by exhaustive tests for nearly 20 years. It is recognized as the standard motor lubricant. The genuine Eagleine is put up in our trade marked, sealed containers, assuring to customers no spurious substitutes.

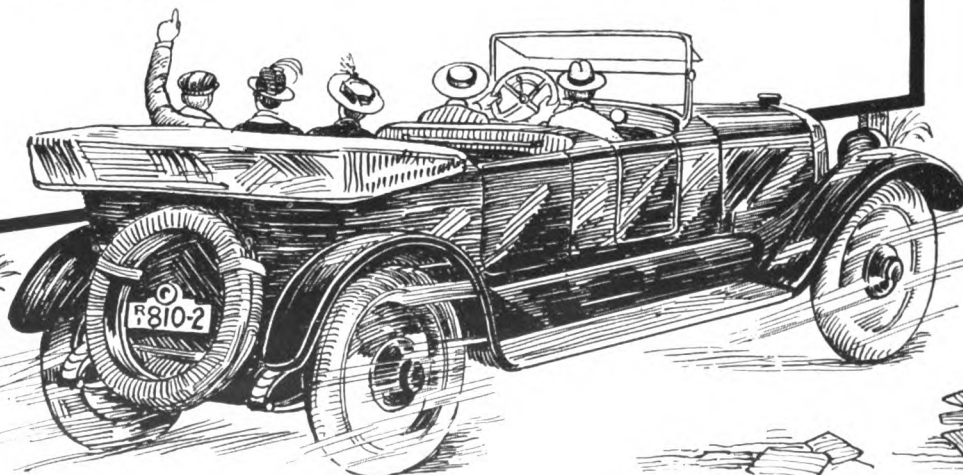
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Parts for any Automobile at a saving of 50% to 80%. Our three great plants cover every state in the Union, and we are therefore in better position to fill your orders.

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Transmissions—Planetary, two-speed, three-speed, four-speed, centre control, with and without multiple disc clutch; all at surprisingly low prices.

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Our Guarantee: You Must Be Satisfied. Any article purchased from us which does not in your opinion, give satisfaction or fit, can be returned to us at our expense and your money will be cheerfully refunded.

Double Tread Tires

Guaranteed for good service.
Some of our prices.

30x3 tire.....	\$5.25
30x3½ tire.....	6.50
34x4 tire.....	9.50

For Non-Skid, 10 Per Cent Extra.

All other sizes on request. 20% deposit required on C. O. D. orders.

Write for list now!

Save 50% on your tire bills.

Saving on tubes also.

M. Liben & Co.

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Our references should command your attention. Any Boston tire agency, Dunn's and Exchange Trust Co. Mgrs. K. S. Brayton, George Vallye.

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32x3½ ...	\$4.85	35x4½ ...	\$9.00
31x4 ...	\$6.00	36x4½ ...	\$9.00
32x4 ...	\$6.00	35x5 ...	\$12.00
33x4 ...	\$7.00	37x5 ...	\$10.00

NON-SKIDS 10% HIGHER.

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EQUIPPED TO CATER TO YOUR WANTS

Send it to Detroit

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Bosch DU-4 Variable spark.....	\$30.00
Bosch Du-4 set spark.....	25.00
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Splittorf 4 cyl. Dixie, high tension	25.00
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WE REPAIR any make magneto, coil, lighting generator or starter and give 24 hour service. Member Detroit Automobile Trade Association.

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"New Parts for All Cars."

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6 volt 100 hour Exide Storage Batteries	\$18.50
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Battery boxes, all sizes.....	\$1 up

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Abbott Cloverleaf Bodies—complete with top and shield....\$150.00
Late type Packard, 7 passenger body, complete with top and windshield 300.00

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For all cars.....\$3 up
Houk Wire Wheels, 34x4½, 36x4½, set of five wheels..... 75.00
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Hayes Crown Fenders for Fords—per set of four..... 15.00
Special ratio Ring Gears—for Fords ratio 4-1..... 12.00
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6 volt Ward-Leonard Generators 15.00
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Write for a copy of our free bargain bulletin.

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Let Us Prove These Facts to You

Size	Tires	Size	Tires
28x3	..\$2.75 up	34x4 1/2	..\$7.50 up
30x3	.. 3.00 up	35x4 1/2	.. 8.00 up
30x3 1/2	.. 3.75 up	36x4	.. 7.75 up
31x4	.. 5.00 up	36x4 1/2	.. 8.00 up
32x2 1/2	.. 5.00 up	37x4 1/2	.. 8.00 up
32x4	.. 6.50 up	35x5	.. 8.50 up
33x4	.. 6.50 up	36x5	.. 9.00 up
34x4	.. 6.50 up	37x5	.. 9.00 up

We carry at all times firsts and seconds of all well known makes, including, U. S., Fisk, Goodrich, Goodyear, Empire, etc. Special price on 37x5 tires. New Seconds.....\$32.00

Free delivery to all parts of New England if order is followed by check or money order.

Boston Auto Tire Exchange
304 Columbus Ave., Boston, Mass.

Save Money On Your Tires

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TREADO

adds thousands of miles to tires, it rebuilds worn treads, mends large and small cuts and can be applied by anyone. TREADO is a prepared rubber. Requires no cement, heat, patches or rubber.

Full directions on every can. Send today for a can at 50c.

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We carry at all times a full and complete stock of Atwater Kent Parts. Also complete systems and magneto replacements. We are also manufacturer's agents for the

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GREAT SLAUGHTER on Second Hand Auto and Truck Parts of all descriptions, including Magnetos, Carburetors, Starters, Head Lights, Radiators and everything pertaining to the automobile. Consult us first and save yourself time and trouble.

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The Only Complete Stock of POPE-HARTFORD PARTS

in New England. Gears, Rear Ends, Axles, etc. Large 3-ton truck in perfect running order. Will pay spot cash for old cars in any condition.

Write or phone Cambridge 2207.

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Cast Aluminum Welding Sticks & Aluminum Solder for Auto Welding

Cast Aluminum Welding Sticks are furnished in 1/4 inch and 3/8 inch diameter from stock. Guaranteed not over 2% zinc. The alloy is scientifically correct for welding.

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W. F. ALUMINUM SOLDER.

Sample Bar with Instructions.
\$1.00 Post Paid.

United Smelting and Aluminum Company, Inc.

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Splitdorf, Eisemann

And all other makes of Magnetos repaired right.

**Guaranteed Ignition Outfits
\$10. up**

The Magneto Shop

JOHN BRUNSWICK.
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Are you looking for a Truck to manufacture?

I Have It.

Complete patents, plans and blueprints for

FOUR WHEEL DRIVE.

Simple, Economical, Efficient.

Write at once.

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AUTO PARTS—At Your Own Prices. We can supply parts for nearly every make of car. 648 Packards, Interstate Fours, also Truck parts, GMC and other makes.

Write us for Parts. We have them.
STRANDWAY AUTO PARTS CO.,
193-195 H. St., South Boston, Mass.

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All electrical apparatus bought, sold, repaired.

Get Our Prices.

HERBERT AUCOCK.

185 Columbia Ave., Boston, Mass.
Established in 1910.

REPAIR PARTS

For

Magnetos, Coils, Starter and Generator Systems, Brushes, Platinum Rivets.

H. & L. MFG. CO.,

33-35 Liberty St., New York.

SAVE 50% TO 75% ON AUTO PARTS. Pope-Hartford, Columbia, Reo, Buick, Overland, Chalmers, E. M. F. and all others.

Splitdorf, Remy Magnetos.....\$5
Eisemann Magnetos.....\$10
Orders shipped within 24 hours.
CONNECTICUT AUTO PARTS CO., INC.
1070 Main St., Hartford, Conn.

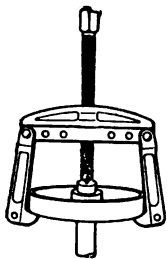
BODIES AT YOUR OWN PRICE.

Large stock of second hand Bodies and Parts—1912, 13, 14, 15 models to close out and make room for new models. We Buy, Sell and Exchange.

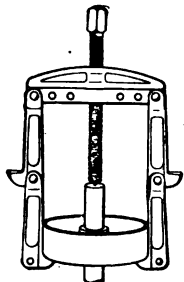
AUTO BODY EXCHANGE.

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Tel. Camb. 1691—808.

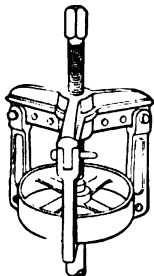
The Crane Wheel and Gear Puller



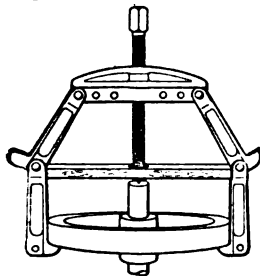
Two-Arm Puller removing work near end of shaft.



Work beyond reach of one set of arms.



Three-Arm Puller pulling from three points will remove collars and work that cannot be started with the two-arm pullers.



Two-Arm Puller on work of large diameter (a piece of wood being used as a spreader).

The most practical device for safely removing fly wheels, auto wheels, gears, cams, sprockets, collars, couplings, commutators, propellers, etc.; bending pipe, straightening shaft and removing universal joints.

The screw has a flat end with inserted tempered tool steel point, that will not spread centers. Makes its own center on work that has none. The strain is taken on the flat end of the screw. The screws are made of high carbon steel and case-hardened all over.

No. 0 Puller—Designed for all kinds of small work—including timing gears, magneto and pump shaft gears, etc., that are designed to be removed by stud-bolts screwed in tapped holes in the web. The forked stud-bolts, shown attached to the hook end of the arm with pins, are furnished blank and can be drilled and tapped by the purchaser for the proper thread of his work; and case-hardened headless set screws can be used for the stud. This puller takes light work 5 inches in diameter and 3 inches from the end of shaft. It has the new patent Locking Arm, forked stud-bolts and case-hardened screw.

Made with two arms only, weight 2½ lbs., each.....\$2.50

Both No. 2 and No. 3 Pullers are made in 2 and 3 Arm styles.

Furnished with one set of Combination Hook and Extension Arms and one set of Thin Jaw Arms.

No. 2 Puller—Takes work 9 in. in diameter. One set of arms reaches 5½ in.; two sets arms reach 11 in. This size is particularly adapted for the average garage and repair shop.

Two-Arm style, weight, boxed, 16 lbs., each.....\$8.00

Three-Arm style, weight, boxed, 19 lbs., each.....\$10.50

No. 3 Puller—Takes work 13 in. in diameter. One set arms reaches 6 in.; two sets arms reach 13 in. This size will meet the requirements of work of all kinds.

Two-Arm style, weight, boxed, 28 lbs., each.....\$10.00

Three-Arm style, weight, boxed, 3½ lbs., each.....\$13.00

NEW CRANE PULLER FEATURES.

Makes this popular device more practical and valuable than ever.

Every garage and repair-man will appreciate these new attachments.

PATENT LOCKING ARM.

A most valuable feature—prevents the arms from slipping off the work.

No. 2 Locking Arm—Reaches 9 inches, fits either two or three arm style of the No. 2 Puller. Weight 2½ lbs., each.....\$1.00

No. 3 Locking Arm—Reaches 10 inches, fits either two or three arm style of the No. 3 Puller. Weight, 3½ lbs., each.....\$1.25

PIPE BENDING AND SHAFT STRAIGHTENING ATTACHMENT.

For use with Two-Arm Pullers only; consists of a pair of arms with hooks at right angles to the hooks on the regular arms and a forked end for the screw. It is indispensable in a repair shop for straightening propeller and jack shafts, bending exhaust pipes, removing universal joints, etc.

No. 2, Wt. 6½ lbs., each.....\$2.75 No. 3, Wt. 9½ lbs., each.....\$3.50

EXTRA SIZE NO. 3 BEAMS.

No. 3 X Two-Arm—Takes work 16 in. in diameter. Weight 13½ lbs., each..\$5.56

No. 3 X Three-Arm—Takes work 28 in. in diameter. Weight, 22 lbs., each..\$12.00

ARBOR PRESS BASE.

This attachment bolts to the bench. Your Puller is fastened to it with two set screws, making an excellent and practical arbor press.

No. 2—2-Arm Base, takes work 7 inches in diameter, weight 18 lbs., each, \$5.50

No. 3—2-Arm Base, takes work 11½ inches in diameter, weight 30 lbs., each, \$7.50

CROWFOOT BEAM.

A combination two and three arm beam does the work of both.

No. 2—Weight 7 lbs., each....\$4.00 No. 3—Weight 13 lbs., each....\$5.94

PRICE LIST OF EXTRA PARTS.

NO. 2 PULLER.			NO. 3 PULLER.		
	Each			Each	
2-Arm Beam.....	Weight 4½ lbs.	\$2.56	2-Arm Beam.....	Weight 7½ lbs.	\$3.56
3-Arm Beam.....	" 5½ "	3.34	3-Arm Beam.....	" 10½ "	4.44
Screw	" 2½ "	2.00	Screw	" 5½ "	2.20
Combination Arms ..	" 1½ "	.80	Combination Arms ..	" 2½ "	1.00
Pins .....		.06	Pins .....		.06

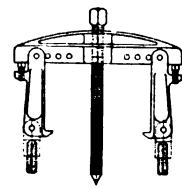
INSTRUCTIONS FOR USING.

KEEP SCREW WELL LUBRICATED with graphite grease, especially for heavy work. Also grease point of screw to prevent cutting.

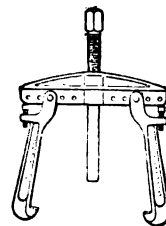
The tendency to twist off work caused by friction of screw in the beam under heavy strain with the Two-Arm Puller should be overcome by holding against this strain with a monkey wrench on the end of beam. The Three-Arm Puller is provided with a lever for this purpose. A piece of emery cloth or sandpaper put under the hooks rough side down will keep them from slipping.

Tie or wire the arms to the work. When removing fly-wheel with spokes and the hooks will not fit down on the hub, turn the arms around with hooks facing outward, place parallel pieces of iron across spokes for the hooks to pull on, and tie or wire them to hold securely in place.

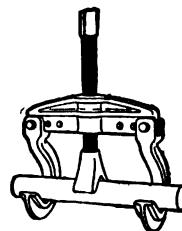
When using the Two-Arm Puller, be sure to have point of screw directly in center line of hooks and not a little to one side. In pulling on irregular work, care should be taken to have each arm pull evenly by placing blocks under arm on short side of work or the screw will be bent.



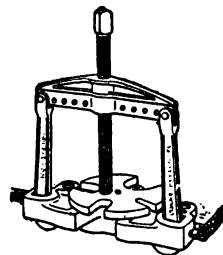
No. 0 Two-Arm Puller.



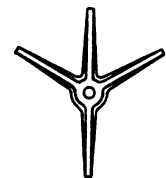
Patent Locking Arm.



Pipe Bending and Shaft Straightening Attachment.



Arbor Press Base.



Crowfoot Beam.

GUARANTEE We guarantee the materials and workmanship in these tools and will replace any defective part without question and absolutely free of charge upon return of defective part to us.

CRANE PULLER CO., - - - Arlington, Mass.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

YOUR DEALER SELLS THEM



"Mosco" Specialties are Made on Honor and Guaranteed to Afford Full Satisfaction in Any Service

The "MOSCO" trade mark protects both dealer and consumer. The complete line is sold by all jobbers and dealers. The "MOSCO" latest catalogue at request. Specify "MOSCO" specialties, accept no others. The first cost is no greater and the long service life and satisfaction afforded by all "MOSCO" specialties has brought a demand wherever motor cars are used.



Patented
Mar. 7, 1916

The Mosco Valve Grinder

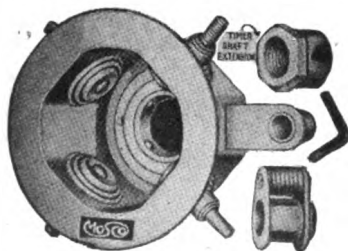
This tool differs radically from others in several respects. It is really more of a machine than a hand tool, as it renders valve grinding an accurate mechanical operation rather than a guesswork hand job.

It has been found that a much more rapid motion can be obtained with the Mosco Grinder than with the ordinary tool, resulting in a very superior finish on the seats.

The device is made of the best materials and is thoroughly guaranteed in every respect. At the low price at which it is listed there should be one in every kit, when it is considered that it is offered not only as a tool, but as a QUICKER, SAFER and BETTER METHOD of valve grinding.

PRICE \$1.75.

Improved Bemus Ball Contact Timer for Ford Car



Cheapest in the long run.

All wearing parts renewed at cost of 27c.

Easier Starting. Grease Cannot Prevent Contact.

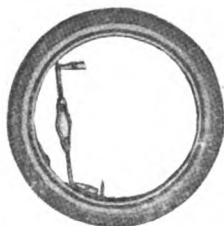
Unbreakable Heavy Steel Shell.

Smoother Running. Contact Is Positive.

Longer Life. No Fibre Ring to Wear Humpy.

PRICE \$2.25.

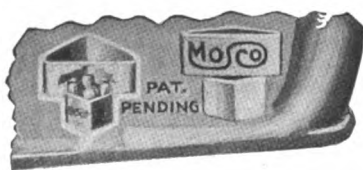
Mosco Tire Rim Tool



Provides a quicker and easier method of changing tires.

Price \$2.50 Each

Mosco Socket Nut and Bolt Holder For Ford Car



Position on Crank Case Bolts.

engage wall of crank or transmission case and prevent nut or bolt head from turning while the man underneath the car unscrews the bolts.

PRICE, 15c EACH.

A REAL TIME SAVING DEVICE.

Simply slip MOSCO Nut and Bolt Holder over the top of each Engine or Transmission nut or bolt head. The wings protruding above the hex socket

SPECIALTIES

MOSCO Floating Plunger Wheel Puller

Starts a "Frozen" or "Stuck" wheel instantly. Strike the plunger; turn the screw, strike again and the wheel comes off without injury to hub-threads, spokes or axle.

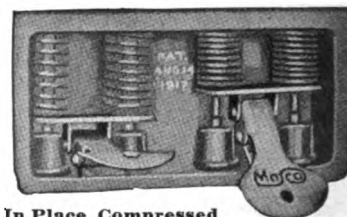
Made for 200 models of 40 popular cars.



FLOATING
PLUNGER
PAT'D
MAR. 24 1914
DEC. 15 1914

Mosco Valve Spring Compressor For Ford Car

Place the compressor in position as shown on left hand of illustration, pushing it back against cylinder wall, and making sure that tongue which hangs down is over the edge and resting in channel, then push down on handle as far as it will go. This compresses two valve springs at one operation and permits removing of pins. Should the pins be crosswise turn valve around until they are in position to pass through slots in compressor. After grinding valves reverse above operation.



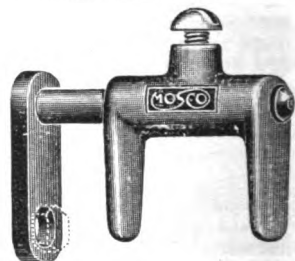
In Place Compressed

PRICE 50c EACH.

Mosco No. 500 Fan Belt Guide for Ford Cars

A safeguard against the familiar trouble of belt slipping on greasy fan pulleys. Attached to side of timer gear housing without extra hole or bolt.

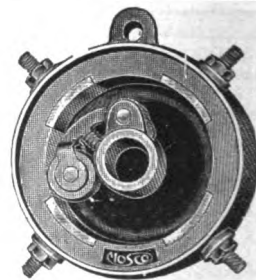
PRICE 25c EACH.



Mosco No. 200 Timer For Ford Car

Made of extra heavy pressed steel. Gray bone fibre is used for raceway, with steel inserts dovetailed in and all lathe finished to a polished surface. The threaded terminals are insulated by fibre washers all the way through to contact points, thus removing cause of short circuiting common to this style of Timer. Oil can be opened with tip of oil can, is self-closing and dust-proof. Brush assembly has die cast rotor, laminated pressed steel arm, and compression spring between roller and rotor.

Price, complete with brush, Hex terminals, pin and collar, \$1.50 each.



Patent Oct. 31, 1916.

The "Mosco" Trade Mark is Your Guarantee of Quality

Motor Specialties Company, :: Waltham, Mass.



(When Writing to Advertisers, Please Mention The Automobile Journal.)

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VOL. LXV.

JULY 10, 1918.

NO. 10.

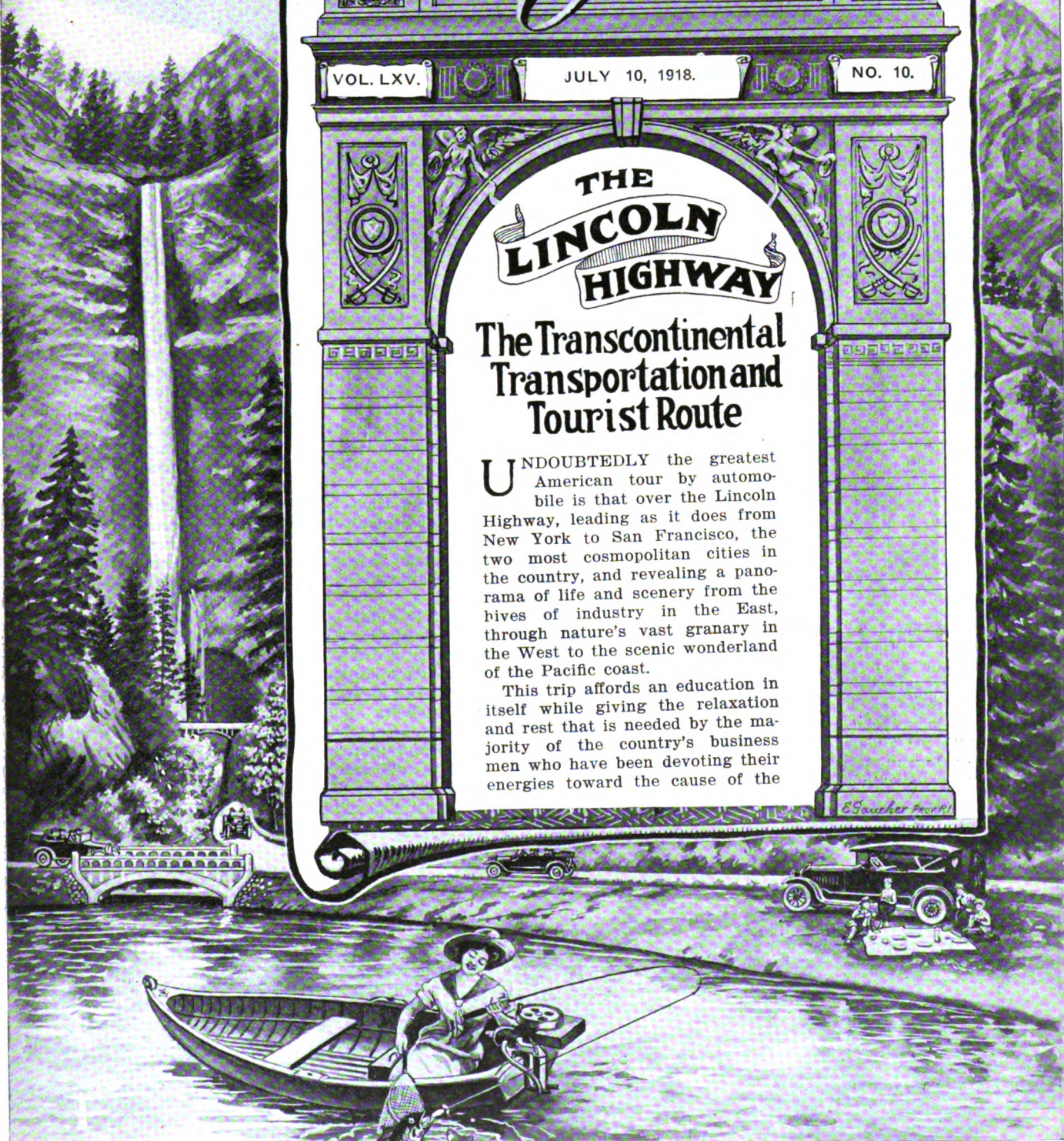
THE LINCOLN HIGHWAY

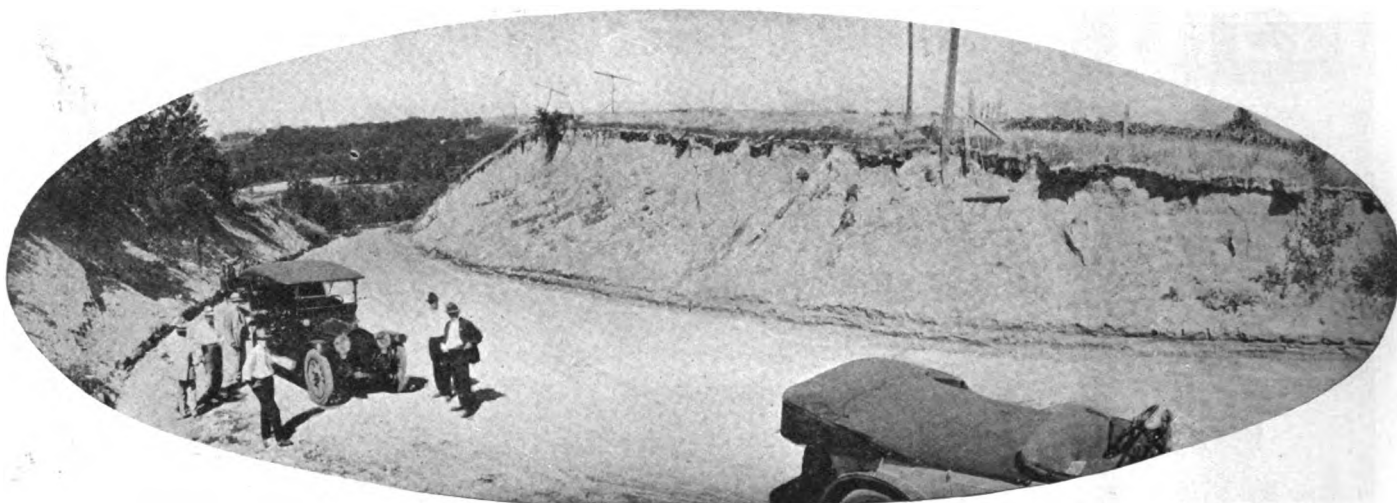
The Transcontinental Transportation and Tourist Route

UNDOUBTEDLY the greatest American tour by automobile is that over the Lincoln Highway, leading as it does from New York to San Francisco, the two most cosmopolitan cities in the country, and revealing a panorama of life and scenery from the hives of industry in the East, through nature's vast granary in the West to the scenic wonderland of the Pacific coast.

This trip affords an education in itself while giving the relaxation and rest that is needed by the majority of the country's business men who have been devoting their energies toward the cause of the

E. S. Gaucher Proprietor





Road Construction Is Rapidly Progressing on the Lincoln Highway in Iowa. Scene Shows Work of Reducing Grade and Curve on Long Stretch.

war with an unprecedented intensity and vigor. To rehabilitate and reenergize themselves for a continuance of these activities, which must be increased to the breaking point, there is no better way than the long tour by automobile, which gives mental and physical rest through change of environment, to say nothing of the thrills of patriotism and joy of life that are experienced in visiting the great national cantonments where America's youth is in training to enfranchise the world.

No other tour of its length affords as fine a combination of scenery, good highways and variety of climate. While conditions of the roads to be encountered on a trip from coast to coast are not all good, they are far better than ever before and are being improved at a rapid rate owing to the increasing importance of the highway to aid transportation of war materials.

In 1917 approximately \$2,225,000 were spent in the 11 states through which the Lincoln Highway passes upon its improvement, less, however, than in any other one year since its announcement and dedication. Largely due to the urging of the Council of National Defense and the Federal interest in the improvement of the route as a main military strategic and commercial backbone highway, and with the Federal aid extended for the improvement of such highways, plans for 1918 indicate the expenditure

of over \$4,000,000, or nearly 100 per cent. more than in 1917. Construction will be under way in many states, but in every instance good detour roads will be provided by the local authorities.

One cannot start out now for a trip across the United States anticipating boulevard conditions from coast to coast and it will be many a long year before such a motorist's millennium is realized. But one can start out with a definite knowledge of just how he is going, what the conditions are in each state, approximately the length of time the trip is going to take, what its cost will be, and can be very certain of arriving at his destination almost upon schedule time if proper care is exercised and the really very few necessary preliminary precautions taken.

The tourist driving the Lincoln Highway in 1918 should remember that many of the long stretches of perfect construction which he will pass over would have been a few years ago impassable bogs if wet or inches deep in dust if dry.

The Lincoln Highway across New Jersey is macadam in its entirety, but due to the tremendous traffic which it has carried this past winter, particularly the companies of motor trucks carrying government supplies from inland points to Atlantic coast ports, sections of the route have suffered rapid deterioration. Improvement of these sections will be under way this year and ultimate con-

struction of a more permanent type of pavement has been advocated by State Engineer General George W. Goethals of Panama Canal fame, who has foreseen the real economy of constructing such main line highways of the most permanent and lasting type, even regardless of first cost.

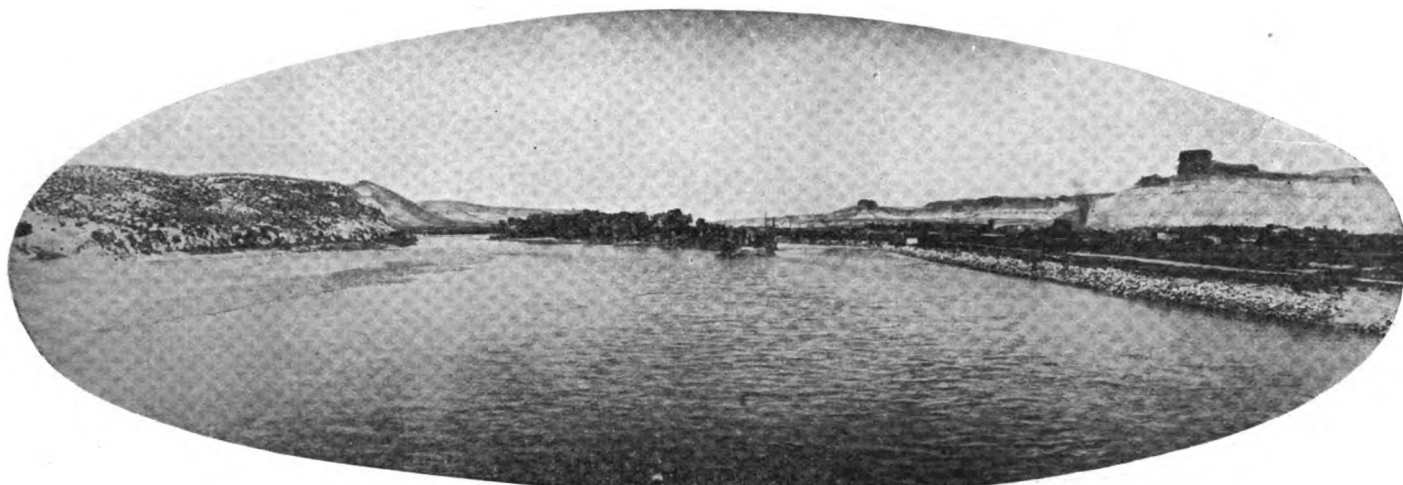
Approximately 400 miles across Pennsylvania, through the Allegheny mountains, the Lincoln Highway is smooth, well kept macadam, and leads through a country of the utmost scenic beauty. There are but 14 miles of Lincoln Highway unimproved in the State of Pennsylvania.

Travelers of the present year may be forced to make numerous short detours in Ohio due to Lincoln Highway improvement in progress. Permanent construction is to be rushed in each of the 13 counties of the state traversed by the highway as a patriotic response to the request of the Council of National Defense, for the improvement of the Lincoln Highway.

Less than 20 miles of really bad roads are encountered in crossing the entire State of Indiana. Long stretches of brick and concrete highway testify to the endeavor of the people of the Hoosier state to bring this great memorial highway into the perfect condition which its importance justifies. In dry weather the trip across Illinois, Iowa and Nebraska can be made over well graded, dragged



Many Miles from Civilization in the Great Desert in Western Utah.



Lincoln Highway Near Green River, Wyoming, Sweetwater County. Green River and Castle Rock on the Right.
A Western Waterway.

and drained dirt roads, but in the latter two states especially rain furnishes a barrier to all traffic. When it rains the tourist must stop, if he wishes to save his car, his time, his tires and his temper.

Due to the exceptionally heavy traffic of the past year, sections of the Lincoln Highway in Wyoming gave way and presented very bad traveling to the motorist using the road late in the year, but the Wyoming State Highway Department, with the assistance of the county authorities all along the route, has promised to have the Lincoln Highway in condition for such traffic as it is called upon to carry during the present year.

In Utah and Nevada that part of the Lincoln Highway properly known as the desert section is encountered. The drive from Salt Lake City to Ely, Nev., should not be lightly attempted. Adverse weather conditions here can make the road impassable, but when dry the route can be and is driven without difficulty.

The route of the Lincoln Highway in Utah has presented a situation which local means were inadequate to remedy. It has existed at a most strategic point through which all traffic crossing the continent within a radius of 500 miles north and south must flow to reach the junction point at Ely, Nevada, which travel for both northern and southern California diverts. It was recently announced by the Lincoln Highway officials that a new road eliminating the

winding, tortuous trail which has been the only connection between the East and the Pacific coast, will be constructed—a direct short cut through the mountains and across the desert of western Utah, which will cut 50 miles from the transcontinental route and eliminate one-quarter of the entire distance across the state of Utah.

To connect up the new proposed short-cut across the desert it was found necessary to open the pass connecting the two valleys and which while passable to the natives on horseback and to light horse drawn vehicles, shut off the fertile Rush Valley from Skull Valley and the desert on the west, and formed a barrier which ended the state highway at Clover.

After careful investigation it was discovered that the desert road could be built for \$100,000 and that the mountain pass could be built for \$25,000.

The State of Utah will spend this sum on the Lincoln Highway, in addition to the association's fund, considerably over \$175,000.

Automobiles have been driven over the Lincoln Highway from New York to San Francisco in slightly over five days, elapsed time, and the round trip has been made in 10 days, 21 hours and three minutes, but these are records made by racing drivers specially prepared for the grilling ride which had to be made at utmost speed night and day. About a month is required to make the trip as a tour, an average of 18 miles and upward

an hour being maintained during the driving time of about 10 hours daily. There are many stretches where the motorist can crowd on all the speed of which his car is capable, as the roads are good and traffic extremely light.

First Through New Jersey.

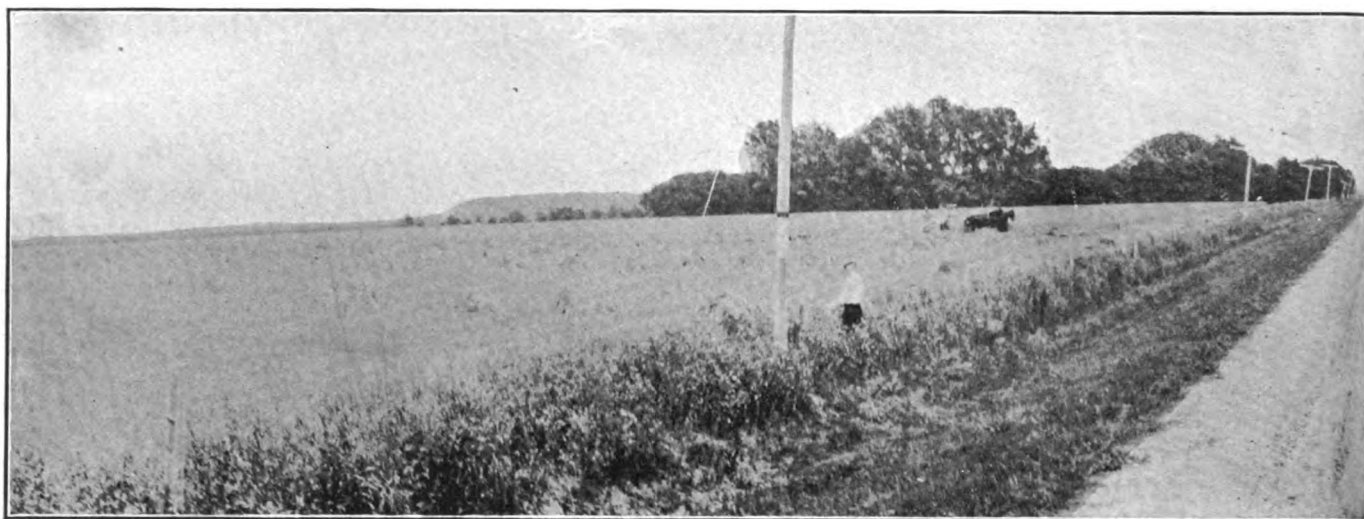
Starting at 42nd street and Broadway, in New York City, the world's greatest centre of traffic, the Lincoln Highway runs for a short distance, where the tourist drives aboard the ferry and takes a brief trip across the majestic Hudson to the Jersey shore. At Jersey City the route lies out over the Essex-Hudson plank road, which has been transformed into a beautiful boulevard. This road, which has been in use for over 100 years, runs out through Princeton, famous as the seat of the college of that name, formerly headed by President Wilson, on to Trenton, the Capital of the state.

In crossing the Delaware river the tourist is reminded of the famous exploit of the country's first President, who took his army in small boats and guided them to the other shores on a cold winter's night through ice packs and jams that for a time threatened the success of the enterprise. This famous manouever of Washington's during the Revolutionary War was enacted not far from the present site of the bridge that crosses the river at this point.

At Valley Forge, where the famous commander and his men survived a winter of extreme hardships, is a chapel, erected



Another View Across the Vast Expanse of Sand Deeply Rutted by Automobile Traffic.



The Highway in Nebraska Passes Through the Great Wheat Fields, Where Millions of Bushels of Wheat for the Allies Are Raised.

to the memory of the steadfastness of the men who faced starvation and death from freezing. Along the route through this section are found markers describing these events that stand out conspicuously in the history of America.

Through Scenic Pennsylvania.

Out over the Old Lancaster Pike, through the town of that name and on to Columbia, York, where the famous battle of Yorktown was fought, and to Gettysburg, where the most gigantic struggle between the forces of the North and South during the Civil War was waged, the highway is the most perfect of any in the country and lies through a section which holds the most historic lore of the United States, having been the battle ground of armies in conflicts that determined the perpetuation of the Union.

An arch at Chambersburg tells of the passage of Lee's army along the road on their trip through the city, which they reduced to ashes. Through Bedford and Ligonier to Pittsburgh, the center of the country's steel and iron industry, surrounding settlements indicate the comparative newness of the territory, although here and there one sees the remaining evidences of the white man's earliest attempts to establish communities, or monuments or memorials marking these historic spots.

Crossing Ohio the route lays through Canton, the home of the late martyred President, William McKinley; Mansfield and Lima, all thriving industrial centers. Throughout this part of the route and in Indiana, passing through Goshen, Ft. Wayne and Elkhart, one notices the many signs, markers and arches indicating the Lincoln Highway route.

At Valparaiso, just before crossing the line into Illinois, is Valparaiso University, which has more students than any other institution of learning in the United States. The highway passes 18 miles south of Chicago, through Chicago Heights into Joliet, thence to De Kalb and Dixon. In the latter place there is a marker showing where Lincoln delivered his speech in 1856 in one of the famous Lincoln-Douglass debates, when he was

running for the presidency.

Through the World's Granary.

From the industrial communities the route now passes into Iowa, a farming state, but which has the record for per capita ownership of automobiles. In passing through Clinton, Cedar Rapids, Marshalltown and Jefferson to Council Bluffs the prosperity that the high prices of farm products has brought the residents is in evidence on many sides. After leaving Omaha the route continues directly west through Nebraska over the famous dirt roads of that state.

Division of the Route.

From Cheyenne there are two highways leading south from the Lincoln Highway, one going through Greely and Brighton into Denver, and the other passing down to the Rocky Mountain National Park.

The Lincoln Highway leads out of Salt Lake City to the southwest, passing around the Great Salt Lake Desert and over natural roads for stretches of hard salt substances, which permits of driving at any rate of speed desired. Barren territory is also found throughout most of the trip across Nevada, although there are conveniently located stations and settlements where tourists may acquire necessary supplies.

Reno is reached at the end of about three days after entering Nevada. From this point there is the choice of two routes leading into Sacramento. The tourist may either go north around Lake Tahoe via Truckee or southward through Carson City along the shores of the wonderful lake. In passing over the Sierras the road at times reaches an altitude of 7000 feet.

ITINERARY.

LINCOLN HIGHWAY.

Night Stops—New York City, Philadelphia, Gettysburg, Bedford and Pittsburgh, Penn.; Canton and Lima, O.; South Bend, Ind.; Chicago, Ill.; Clinton and Marshalltown, Ia.; Omaha and Kearney, Neb.; Julesburg and Denver,

Col.; Cheyenne, Rawlins and Green River, Wyo.; Salt Lake City and Kearney's Ranch, Utah; Ely, Austin and Reno, Nev.; Sacramento and San Francisco, Cal. Twenty-Four Days, 3322 miles.

New York-Philadelphia, Pa.

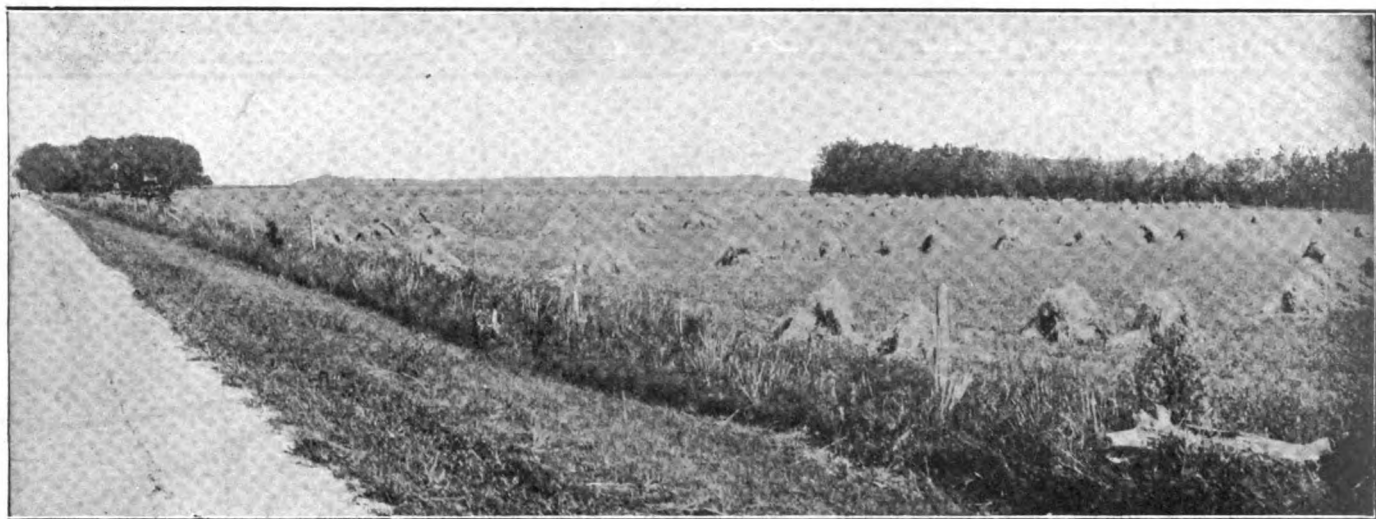
Miles		Miles	
New York.....	0.0	Kington.....	48.2
Weeh'ken, N. J. . .	3.7	Princeton.....	51.5
Jersey City.....	8.0	Trenton.....	62.5
Newark.....	12.2	Oxford Val. Pa. .	68.7
Elizabeth.....	17.1	Glen Lake.....	70.6
Rahway.....	23.0	Langhorne.....	71.6
Iselin.....	27.0	La Trippe.....	76.6
Metuchen.....	29.8	Buiston.....	81.7
N. Brunswick.....	35.1	Philadelphia.....	92.6

Philadelphia-Pittsburgh, Pa.

Miles		Miles	
Philadelphia.....	0.0	Fayetteville.....	135.6
Overbrook.....	6.4	Chambersburg.....	141.1
Ardmore.....	8.4	St. Thomas.....	148.5
Bryn Mawr.....	9.7	Fort Loudon.....	154.5
Wayne.....	14.1	McConnahsburg.....	162.6
Berwyn.....	17.1	Harrisville.....	169.0
Paoli.....	20.4	Breeswood.....	180.5
Whitford.....	29.4	Everett.....	188.9
Downington.....	32.5	Mt. Dallas.....	190.0
Thorndale Sta. . .	34.6	Bedford.....	197.8
Colesville.....	38.8	Wolfsburg.....	200.5
Sadsburyville.....	42.8	Schellsburg.....	207.1
Mt. Vernon.....	47.0	Buckstown.....	218.8
Gap.....	49.5	Kanter P. O.....	222.5
Kinners.....	51.8	Stoyestown.....	223.8
Leaman Place.....	55.2	Farrilton.....	229.5
Paradise.....	56.7	Jenners.....	230.3
Soudersburg.....	60.7	Jennersstown.....	231.5
Lancaster.....	65.0	Laughlinton.....	239.5
Mountville.....	71.4	Ligonier.....	243.1
Columbia.....	75.1	Youngstown.....	251.7
Wrightsville.....	76.9	Greensburg.....	261.6
York.....	88.0	Grapeville.....	265.7
Abbotstown.....	102.9	Adamsville.....	268.4
New Oxford.....	106.8	Irvin.....	271.3
Gettysburg.....	116.6	Jacksonville.....	272.5
Seven Stars.....	120.5	E. McKeesport.....	278.7
McKnightstown.....	122.4	Turtle Creek.....	281.0
Cashtown.....	124.3	E. Pittsburgh.....	282.1
Grafenburg.....	129.2	Wilkinsburg.....	284.9
Caledonia.....	131.2	Pittsburgh.....	292.3

Pittsburgh, Pa.-Ft. Wayne, Ind.

Miles		Miles	
Pittsburgh.....	0.0	W. Brookfield.....	111.6
Bellevue.....	5.8	E. Greenville.....	112.9
Avalon.....	6.6	Dalton.....	118.6
Glenfield.....	10.4	East Union.....	124.5
Sewickley.....	17.2	Wooster.....	136.5
Fairoaks.....	18.5	Jefferson.....	144.5
Ambridge.....	21.0	N. Pittsburgh.....	146.3
Economy.....	21.8	Rowsburg.....	143.5
Baden.....	25.0	Ashland.....	158.7
Conway.....	26.4	Mansfield.....	164.3
Freedom.....	28.2	Ontario.....	171.0
Rochester.....	30.1	Gallion.....	179.3
Beaver.....	31.4	Bucyrus.....	183.0
Eather.....	41.7	Nevada.....	201.0



Good Roads Are Indispensable in This Section, as the Enormous Loads of Grain Are Constantly Moving from Field to Market or Shipping Points.

Ohioville	43.0	Up. Sandusky.....	209.0
Smith's Ferry.....	46.0	Forest	222.2
E. Liverpool, O.....	50.6	Dunkirk	230.1
Lisbon	66.4	Dola	233.9
Hanoverton	75.9	Ada	240.8
Kensington	77.0	Lima	258.5
E. Rochester.....	81.7	Gomer	268.1
Minerva	85.7	Delfhos	276.4
Robertsville	91.5	Van Wert.....	289.2
Osnaburg	97.0	N. Haven, Ind.....	315.5
Canton	101.8	Ft. Wayne.....	321.9
Massillon	109.5		

Ft. Wayne, Ind.-Clinton, Ia.

Miles		Miles	
Ft. Wayne.....	0.0	Chic. Heights.....	154.9
Churubusco	13.6	New Lenox, Ill.....	172.0
Merriam	22.6	Joliet	178.1
Wolf Lake	25.6	Plainfield	187.7
Kimmell	30.4	Aurora	200.7
Ligonier	36.4	Mooneheart	205.6
Benton	46.7	Batavia	209.6
Goshen	53.8	Geneva	212.6
Elkhart	62.0	De Kalb	234.9
Jaccola	68.0	Malta	239.8
Mishawaka	72.1	Creston	245.6
South Bend.....	76.1	Rochelle	251.7
New Carlisle.....	91.7	Ashton	263.1
La Porte.....	103.7	Frank Grove.....	267.7
Westville	115.5	Dixon	277.0
Valparaiso	126.5	Sterling	290.2
Deep River.....	134.5	Morrison	304.9
Merrillville	141.5	Fulton	316.4
Schererville	147.3	Clinton, Ia.....	319.7
Dyer	150.3		

Clinton, Ia.-Omaha, Neb.

Miles		Miles	
Clinton, Ia.....	0.0	Ames	197.6
De Witt	19.5	Ontario	199.3
Grand Mound.....	25.0	Jordan	207.9
Calamus	31.0	Boone	213.7
Wheatland	35.2	Ogden	223.3
Lowden	41.2	G. Junction.....	235.3
Clarence	49.7	Jefferson	243.6
Stanwood	54.4	Scranton	253.6
Mechanicsville.....	60.0	Glidden	265.1
Lisbon	66.9	Carroll	284.1
Mt. Vernon.....	68.6	West Side.....	296.4
Marion	81.5	Vall	302.2
Cedar Rapids.....	86.7	Dennison	311.2
Belle Plaine.....	122.2	Arion	319.1
Chelsea	129.0	Dow City	321.8
Gladstone	135.8	Dunlap	329.9
Tama	140.0	Woodbine	341.4
Montour	148.3	Logan	352.0
Le Grand	152.5	Missouri Val.....	360.7
Marshalltown.....	162.2	Loveland	365.0
La Motte.....	169.6	Honey Creek.....	369.8
State Centre.....	176.3	Crescent	375.6
Colo	183.7	Council Bluffs.....	383.1
Nevada	190.7	Omaha, Neb.....	387.7

Omaha, Neb.-Cheyenne, Wyo.

Miles		Miles	
Omaha	0.0	Gothenburg	259.3
Elkhorn	16.2	Brady	272.4
Waterloo	19.5	Maxwell	281.3
Valley	23.0	N. Platte.....	283.9
Fremont	34.9	Hershey	307.0
Ames	42.8	Sutherland	314.4
North Bend.....	50.9	Paxton	327.4

Rogers	58.1	Roscoe	339.7
Schulyer	66.5	Ogallala	347.1
Richland	74.9	Brule	357.5
Columbus	83.1	Megeath	362.2
Duncan	92.3	Big Springs.....	368.0
Silver Creek.....	102.5	Chappell	389.8
Clarks	113.6	Lodge Pole.....	399.1
Central City.....	124.5	Sunol	405.9
Chapman	134.7	Sidney	417.1
Grand Island.....	147.5	Brownson	426.2
Alda	155.3	Potter	435.6
Wood River.....	164.8	Dix Station.....	444.6
Shelton	174.0	Kimball	454.1
Gibbon	180.0	Bushnell	466.0
Kearney	192.7	Pine Bluffs.....	476.0
Odessa	201.8	Egbert	486.1
Elm Creek	208.7	Burns	492.6
Overton	217.9	Hilldale	500.4
Lexington	229.1	Archer	511.8
Conrad	247.1	Cheyenne	520.8

Cheyenne, Wyo.-Salt Lake City, Utah.

Miles		Miles	
Cheyenne	0.0	Latham Sta.....	212.2
Corlett Station.....	5.7	Wamsutter	220.2
Borlie Tower.....	9.3	Tipton Station.....	236.5



Old Faithful Geyser, Yellowstone National Park.

Otto Station.....	14.2	Point of Rocks.....	265
Gran. Canyon S.....	18.7	Thayer June.....	272
Buford	27.2	Rock Springs.....	281
Sherman Hill.....	32.8	Green River.....	296
Tie Siding	39.2	Bryan Station.....	306
Laramie	57.0	Granger June.....	322
Bosler	76.4	Lyman	354
Lookout	85.1	Ft. Bridger.....	359
Harper	90.6	Evanston	396
Rock River.....	96.8	Wyuta Sta., U.....	398
Medicine Bow.....	116.8	Wasatch	406
Carbon	127.0	Castle Rock.....	411
Evansville	135.3	Emory Station.....	426
Hanna	138.5	Main Forks.....	429
Walcott	155.5	Coalville	44
Ft. Steele.....	163.1	Hoytsville	44
Lakota	169.6	Wanship	441
Granville	173.4	Kimball's Rch.....	448
Rawlins	178.7	Roach's Ranch.....	46
Creston Sta.....	208.2	Salt Lake City.....	493

Salt Lake City, Utah-Ely, Nev.

Miles		Miles	
Salt Lake City.....	0.0	Orr's Ranch.....	8
Pleasant Green.....	15.0	County Well.....	10
Ragtown	16.1	Flash Springs.....	144
Garfield	20.3	Callao	16
Lake Point.....	28.1	Ihapa	18
Milltown	30.3	Tippet, Nev.....	27
Grantville	40.3	Anderson's Rch.....	27
Timpie Point.....	54.3	Shellbourne	24
Josepa	70.2	Magnuson's R.....	264
Brown's Ranch.....	77.3	McGill	27
Indian Ranch.....	79.3	East Ely.....	28
Indian Farm.....	84.3	Ely	28

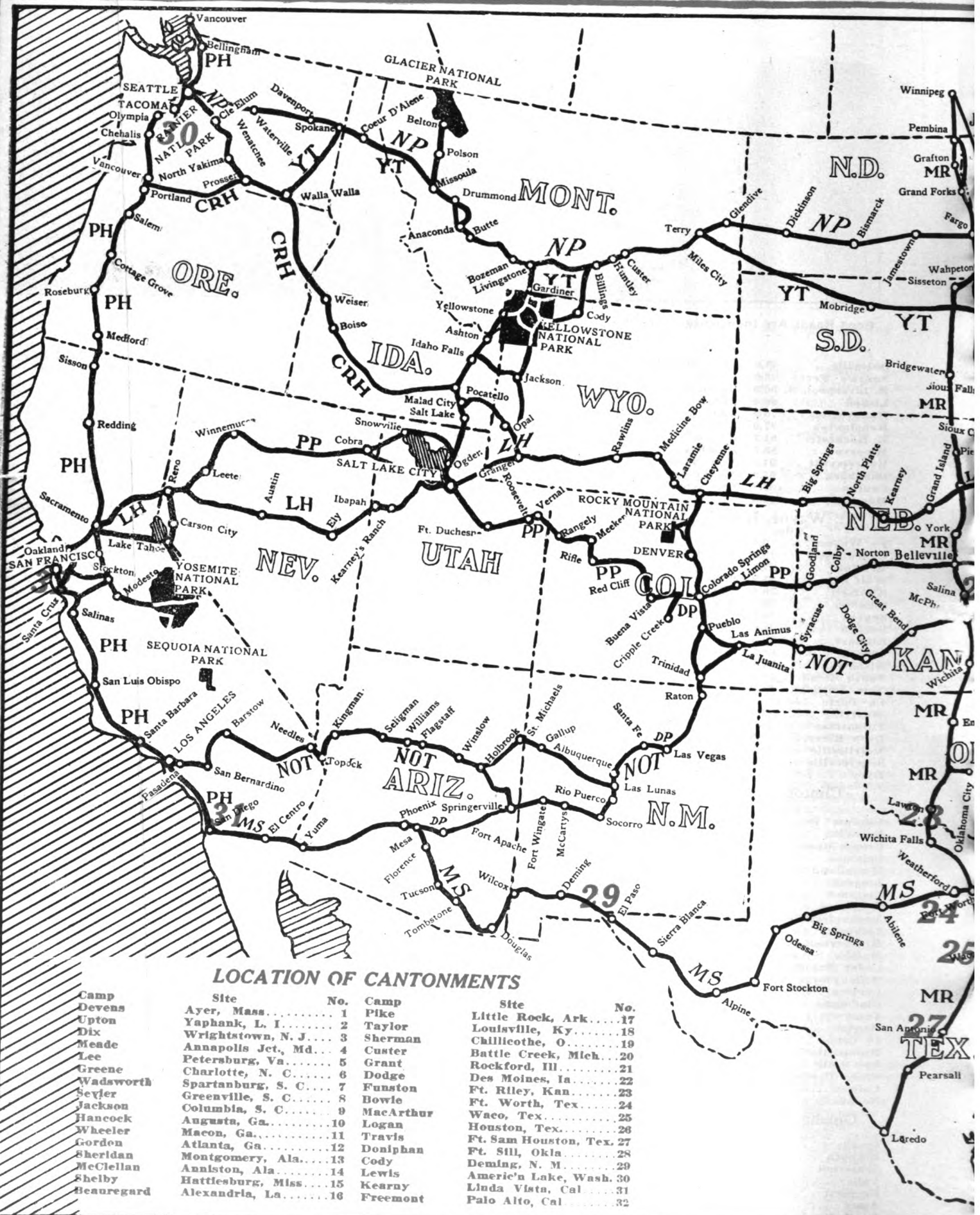
Ely-Reno, Nev.

Miles		Miles	
Ely	0.0	Austin	15
Lane	2.4	New Pass Can.....	18
Copper Flat.....	6.9	Alpine Ranch.....	19
Reipetown	9.0	Eastgate	21
Jake's Summit.....	16.2	Westgate	27
Mooreman's R.....	30.7	Mountain Well.....	24
Rosevar's Rch.....	32.7	Stillwater	26
White Pine S.....	38.7	Fallon	27
Hamilton	44.2	Hazen	29
Six Mile House.....	50.0	Fernley	30
14 Mile H.....	69.8	Wadsworth	31
Pinto House.....	76.4	Derby	31
Eureka	83.6	Vista Station.....	33
Rigley Ranch.....	96.9	Sparks	34
Grimes Ranch.....	124.9	Reno	34
Austin Summit.....	151.9		

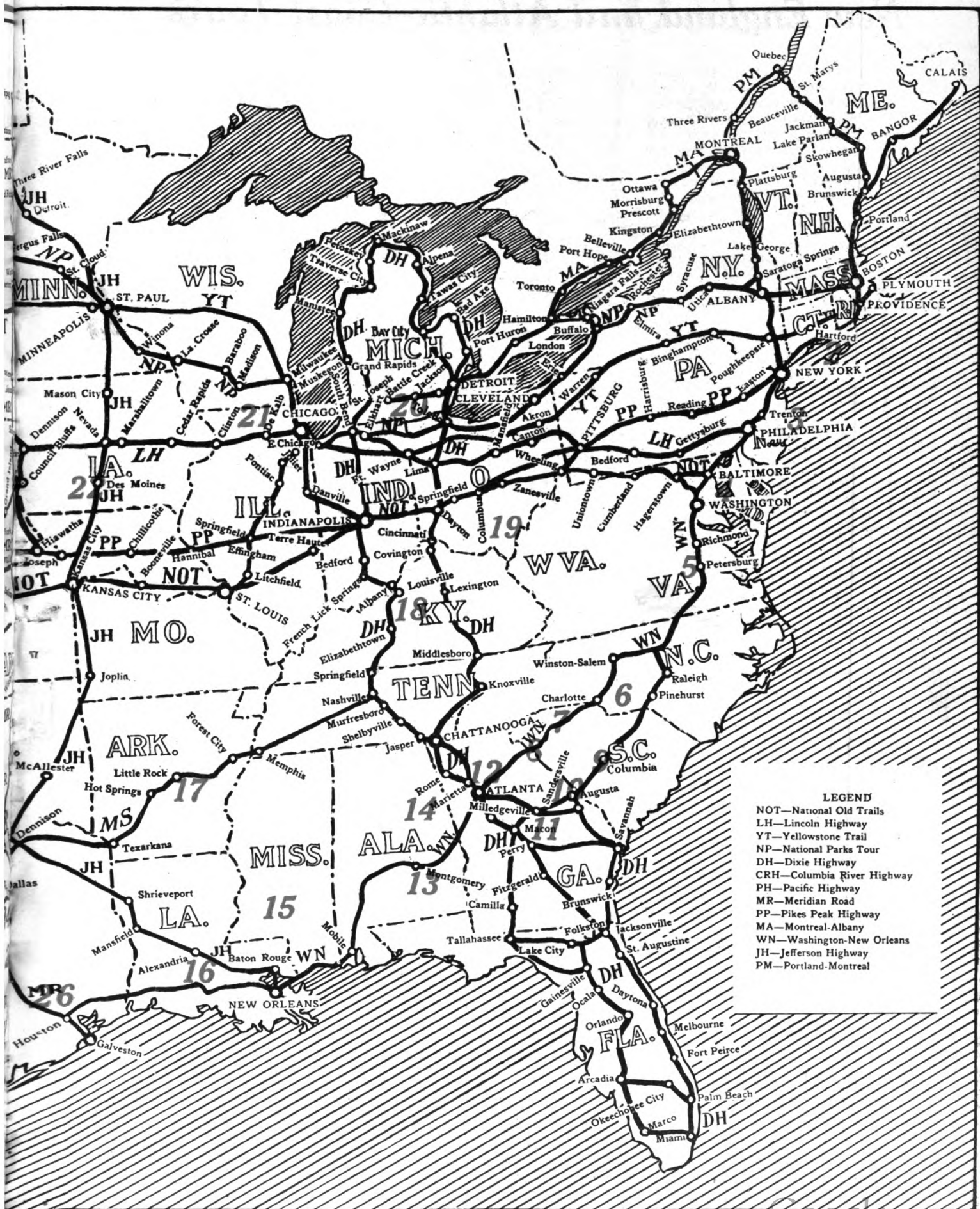
Reno, Nev.-San Francisco, Cal.

Miles		Miles	
Reno	0.0	Sacramento	19
Verdi, Cal.....	10.7	Elk Grove.....	15
Truckee	32.7	McConnell	15
Donner	37.7	Arno	15
Emigrant Gap.....	62.7	Galt	16
Dutch Flat.....	75.8	Woodbridge	17
Gold Run.....	79.0	Stockton	18
Colfax	89.0	French Camp.....	19
Wymar	92.2	Banta	20
Applegate	95.0	Tracy	20
Auburn	104.5	Altamont	22
New Castle.....	109.3	Livermore	22
Penryn	112.6	Hayward	24
Loomis	114.4	Oakland	26
Rocklin	117.0	San Francisco.....	26

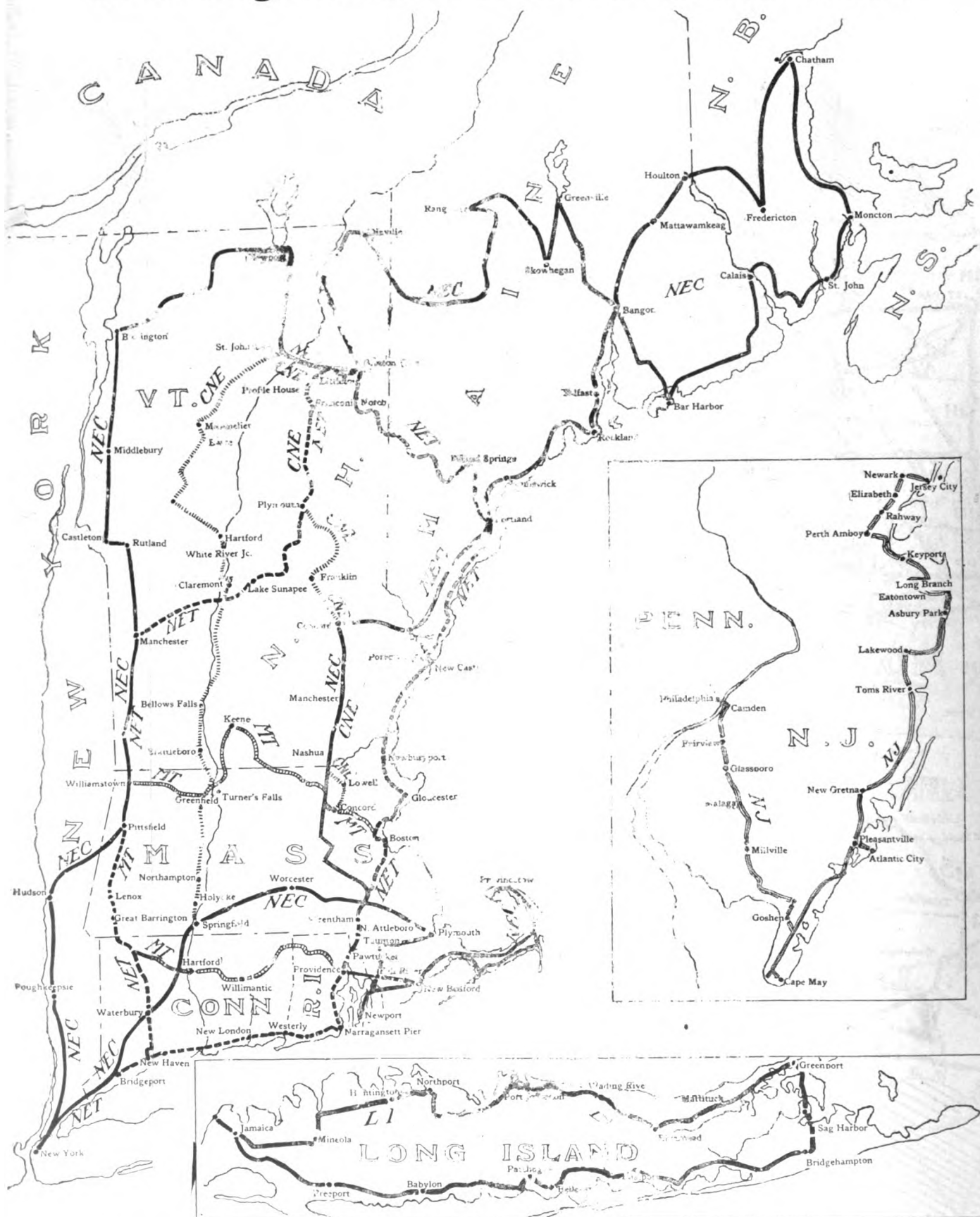
TRANSCONTINENTAL, MERIDIONAL, AND SPECIAL



INTERSTATE TOURING MAP OF THE UNITED STATES



New England and Atlantic Coast Tours



Legend—N. E. C., New England-Canada, Itinerary on Page 20; N. E. T., New England Tour, Itinerary on Page 23; C. N. E., Central New England, Itinerary on Page 25; M. T., Mohawk Trail, Itinerary on Page 26; N. J., New York-Atlantic City-Philadelphia, Itinerary on Page 46; L. I., Long Island, Itinerary on Page 28.

New England Tours

DESPITE the great road building movement in the West and South New England still retains the distinction of being the most popular touring section of the United States, which it earned years ago when its extensive modern road systems attracted the early motorists on vacation trips to the numerous summer resorts that line the Atlantic coast from New London to Bar Harbor and which dot the mountain ranges through Massachusetts, Vermont, New Hampshire and Maine.

Thousands of sportsmen go by automobile into Maine every summer to en-

joy the trout and salmon fishing for which that state is famous, and in the fall it becomes the mecca for hunters. Having made a business of catering to pleasure seekers for nearly half a century, New England affords excellent accommodations for the motorist and the cities and villages being so close together one seldom finds himself in need of aid or shelter many miles from a place where either can be obtained.

Taking the highway conditions as a whole this year, throughout this section, they are in better condition than ever before, although the tourist will find numerous detours on the main routed roads where improvements are being made or new construction in process.

The national cantonment, Camp Devons, outside of Ayer, Mass., where thousands of men are now in training, is naturally the most interesting objective for the tourist in New England this year, although Newport, the well known naval training station, has enjoyed almost equal popularity. Routes and connections for these points are shown on maps on pages 15 and 16.

In proceeding through New England this year the motorist should make it a point to observe the

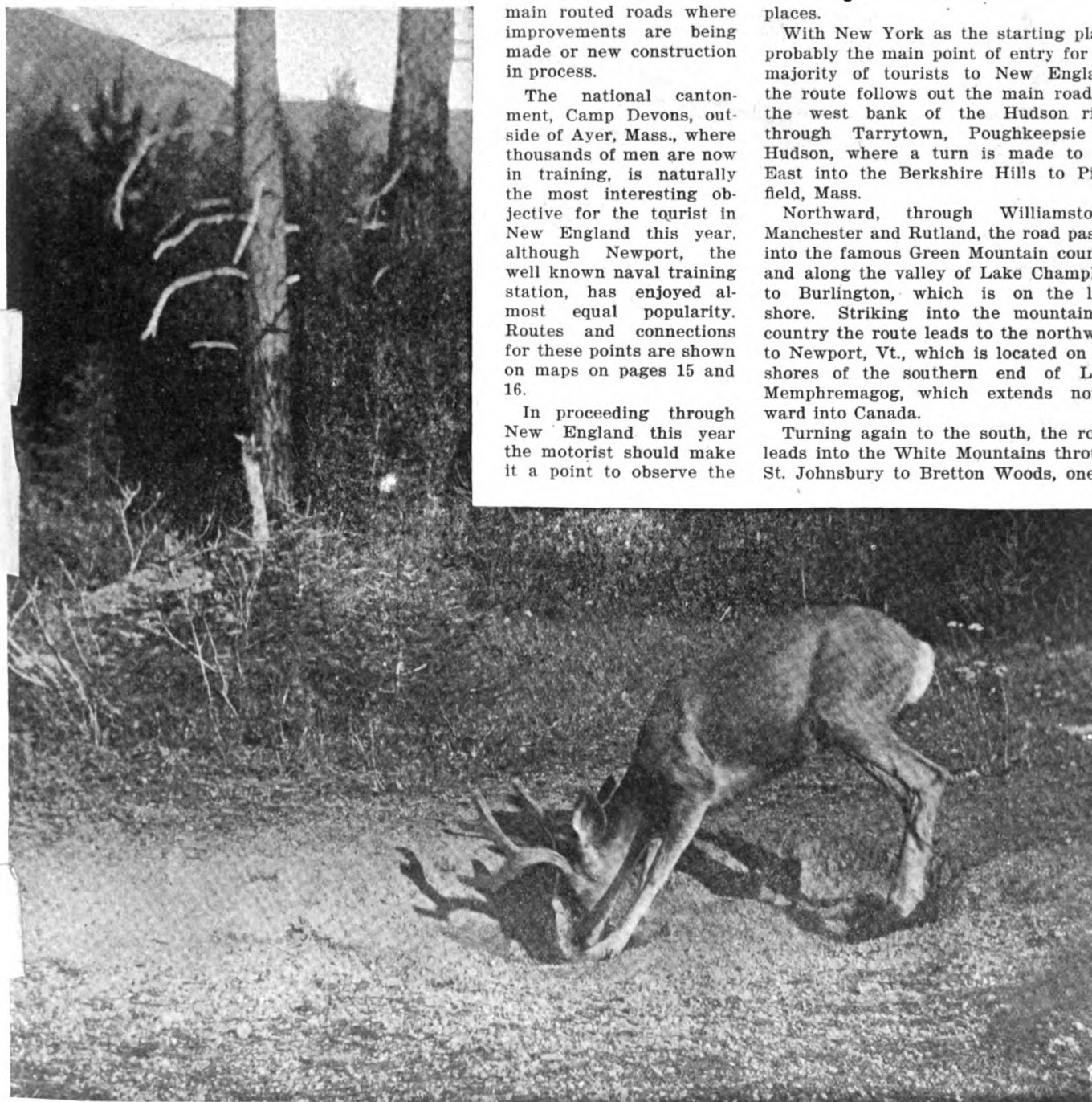
speed limitations, traffic laws and head light requirements, as the authorities Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut are particularly vigilant in enforcing the automobile statutes at present. Extraordinary precautions should be taken in Connecticut, where the state officials have organized special forces to apprehend violators of the law.

In the first itinerary, that designated as the "New England-Canada" tour, a comprehensive trip of about a month is routed around the outskirts of New England, through its principal cities, mountain regions and famous watering places.

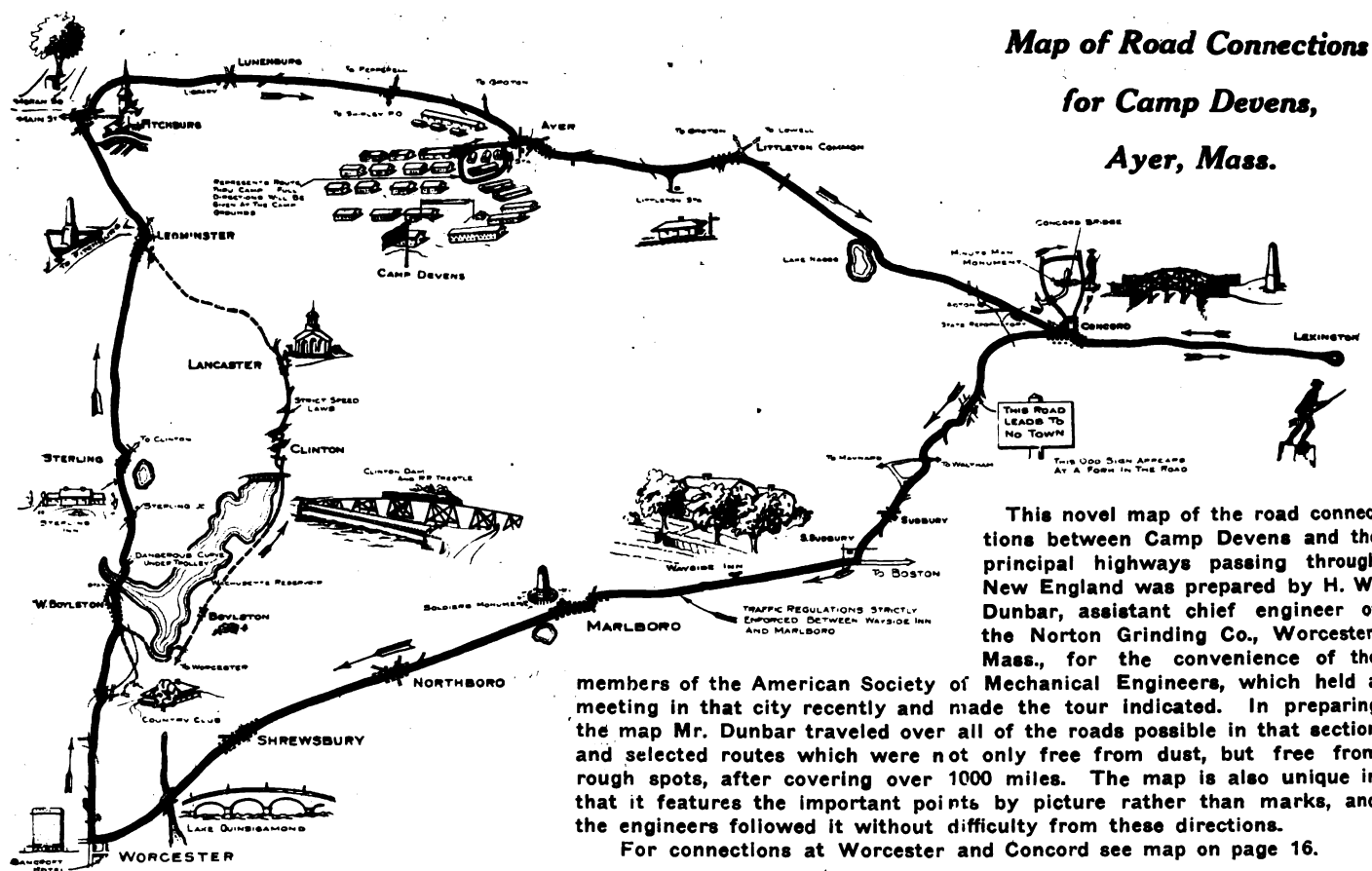
With New York as the starting place, probably the main point of entry for the majority of tourists to New England, the route follows out the main road up the west bank of the Hudson river through Tarrytown, Poughkeepsie to Hudson, where a turn is made to the East into the Berkshire Hills to Pittsfield, Mass.

Northward, through Williamstown, Manchester and Rutland, the road passes into the famous Green Mountain country and along the valley of Lake Champlain to Burlington, which is on the lake shore. Striking into the mountainous country the route leads to the northwest to Newport, Vt., which is located on the shores of the southern end of Lake Memphremagog, which extends northward into Canada.

Turning again to the south, the route leads into the White Mountains through St. Johnsbury to Bretton Woods, one of



Wild Deer Photographed While Drinking in Depths of Maine Forest.



the leading mountain resorts in New England. Mt. Washington is seen in the distance and throughout the surrounding territory the rivers and streams are noted among fishermen as furnishing the finest of piscatorial sport.

Thousands of tourists visit this section every summer to enjoy the fishing, golf, mountain climbing and the cool breezes which never cease to fan the valleys and mountain passes.

On the fourth day out the route turns to the north into the valley of the Connecticut river, thence to the Mohawk into Dixville Notch, another well known scenic point in New Hampshire.

The next swing of the tour leads into Maine, through Newry, Rumford, Dixfield to Rangley Lakes, which for many years has been a rendezvous for anglers.

Great Sporting Country.

In this connection a brief geographical sketch of the state is interesting, as Maine has many distinguishing features. From north to south its greatest length is 303 miles and it is 212 miles across at the widest part. Of the total area, 31,500 miles, 3000 square miles are water and 65 per cent. of the total area is covered with woods. It will be seen at a glance from these figures that it is an ideal home for game of all kinds. All the important fur bearing animals are found within its borders: Deer, moose, bear, fox, beaver, sable, weazle, martin, mink and squirrel. Rabbits, porcupines and wild cats are also plentiful. The 1500 cold lakes abound with many kinds of fresh water fish, including bass, pickerel, salmon trout, rainbow trout, and white perch and other species. Some of

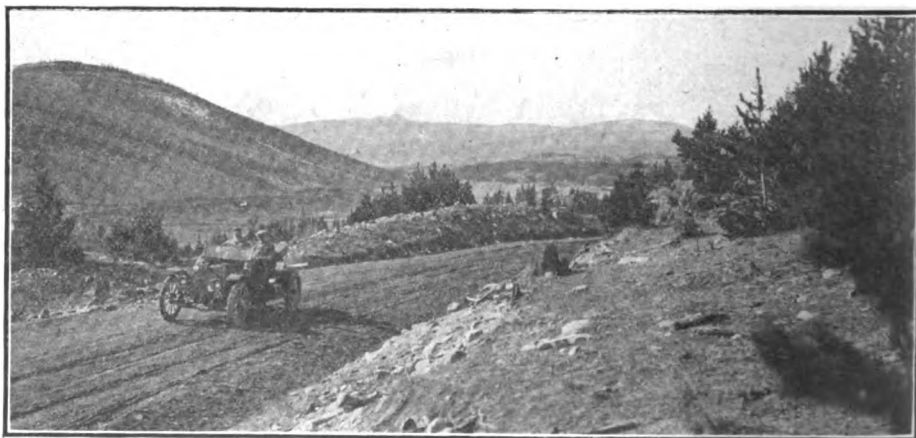
the trout lakes are 2500 feet above sea level.

The Maine laws governing the entry of non-resident owners in automobiles are very lenient. The owners are allowed 30 days in the state without registering their cars, providing the operator is licensed and car is registered in another state and number plates are displayed. If the party intends to remain longer than the 30 days prescribed they are required to pay the same fee as residents. If the length of the stay is known in advance of the trip into the hunting country it is advisable for the party to apply for registration at the office of the secretary of state on the way north. The registration fee ranges from \$5 to \$15, according to horsepower, per year, but cars registered between Oct. 1 and Dec.

31 can be registered for half the regular fee.

The non-resident visiting Maine on a hunting trip must observe a number of regulations that have been imposed upon hunters to preserve the game and protect the state's interests. Non-resident hunters must be in charge of a registered guide during the months of May to November, both inclusive when camping and kindling fires upon wild lands while engaged in hunting or fishing. These guides are not allowed to pilot a party of more than five members.

While the members of the party should procure a copy of the hunting laws and read them carefully, they will not get into any difficulties with a guide, as these men are well posted on the laws and regulations, which are quite complicated.



The Highways Lead for Miles Along the Slope of Mountains and Hills, Which Descend to the Shores of Beautiful Lakes.

The expense of a guide for a party is not excessive, their charge for their services ranging from \$2 to \$4 a day.

Continuing its zig-zag course, the route shifts to the southward for a run of about 80 miles to Skowhegan and then northward again to Greenville Junction on the shores of Moosehead Lake, the largest body of fresh water entirely within New England boundaries. This station on the lake is one of the foremost gathering places for campers, huntsmen and anglers.

For the first time in a week the tourist again turns back toward a centre of industry, touring southward over fine gravel roads through Bangor to Bar Harbor, Bangor, which is located at the head of navigation on the Penobscot river, at the junction with the Kenduskeag. The trip from that point to Bar Harbor should prove one of the most delightful of the tour, as it passes through a country which is typical of Maine's beautiful scenery, the road winding through hills and past scenic lakes to Mt. Desert Island, which is reached over a toll bridge from Ellsworth.

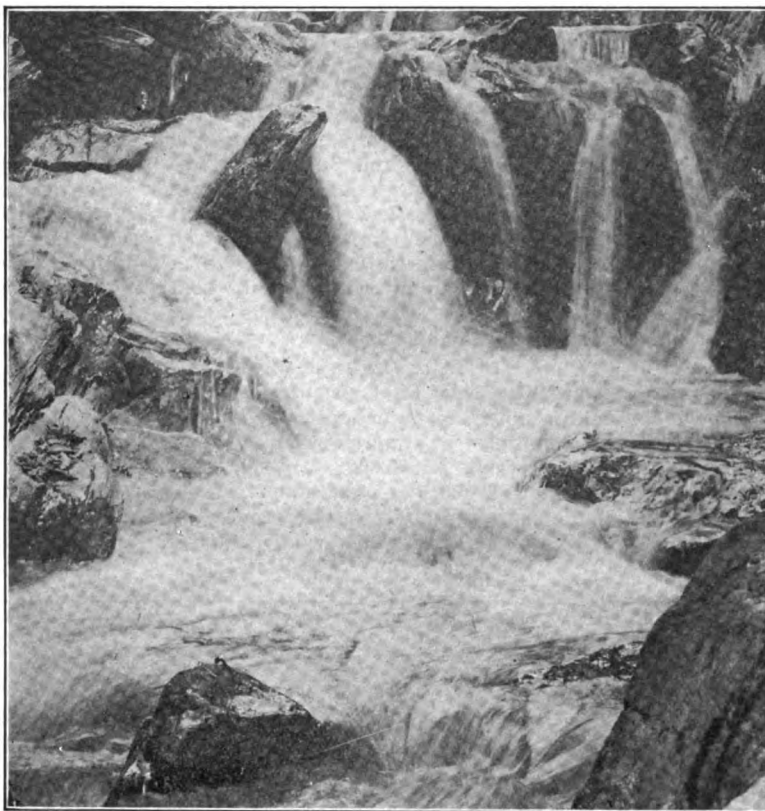
On the island is the latest addition to the national park areas, the Sieur De Monts National Monument, which was accepted by the government a few years ago. It consists of 5000 acres, directly to the south of Bar Harbor and borders on the sea. Within this area there are four lakes and 10 mountains. The scene from the notable Sieur De Monts Crag is one of the most beautiful on the coast.

Around its northern borders are the homes and estates of thousands of wealthy people who spend their summers on the island.

On the way from Bar Harbor to Calais and St. John, N. B., the road is a good dirt highway through a picturesque country along the rugged shore line, which is typical of the rock bound coast for which the State of Maine is noted.

A good road leads out of St. John through the valley of the Petitcodiac river into Moncton. The tides rise and fall in this river many feet, a fact which has made it famous among mariners for many centuries.

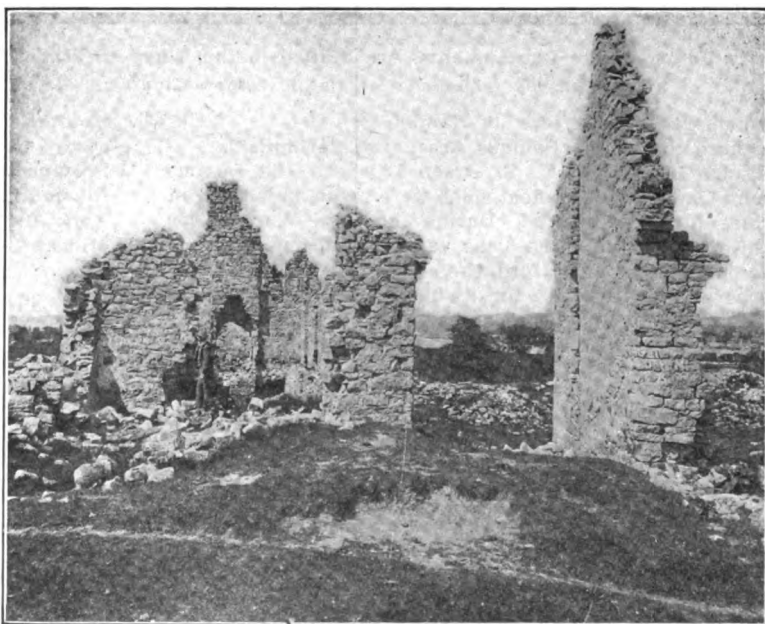
On the remainder of the route through New Brunswick, leading to Chatham, at the head of Miramichi bay, off the Gulf of St. Law-



Famous Bolton Falls on Little River, Vermont.

rence and southward again to Fredericton, the country is wild and unless the weather has been pleasant it should not be attempted.

The Canadian boundary is crossed against, going to Houlton, Me., which is the metropolis of Aroostook county, the leading potato producing county in the world and which recently became the wealthiest per capita in the country as a result of the fabulous prices received for its products. Hundreds of its citizens have made modest fortunes on their potato crops and boom times have prevailed in the county ever since.



Ruins of Fort Ticonderoga on Lake Champlain.

Another stretch of typical Maine country is traversed in going down through Mat-tawamkeag to Bangor, the road passing through the heart of the woods where are located many busy saw mills, and rivers that tumble precipitately on the way to the ocean. Mt. Katahdin of volcanic origin, is passed on this stretch.

On the way to Rockland from Bangor the route passes along the shores of Penobscot Bay and through many picturesque fishing towns and settlements, which, although in existence for centuries, have grown but little. Mt. Desert again comes into view in the distance across the bay and many hills and mountains are passed, including the Meguntook peaks, which tower skyward above the group of which they are a part.

The run from Rockland to Portland has been pronounced one of the most beautiful tours in the country and while the distance is only 81 miles, the tour-

ists are usually satisfied in going slowly and devoting a whole day to the run in order to see the many interesting places and give the necessary time for a thorough appreciation. Bath, which is famous as a shipping building centre, and the place where many of the old war frigates were constructed, is close by the site of the first settlement in New England, at the mouth of the Kennebec river, where a village was founded in 1607 by the English.

A Modern Boulevard.

A boulevard 26 miles in length connects Bath with Portland, the largest city in Maine.

The tour now leads inland to the southwest, running through Kennebunk, which was settled in 1602, and across the New Hampshire line to Dover, the capital of that state. Turning directly southward the route is through Manchester, a great cloth manufacturing town, Nashua, Wrentham and North Attleboro, Mass., to Pawtucket, R. I. The latter city is said to have the most diversified line of manufactures of any city in the country. Crossing the bridge into the centre of the city the first cotton mill ever built in the United States is passed. It still stands near the falls from which power was taken to operate the machinery, and the building is still being used for industrial purposes.

On the hill where Roger Williams landed after being banished from Massachusetts, is Brown University, one of the oldest colleges in the country, and on the westward slope of the same hill is the First Baptist Church founded by the famous Baptist divine.

Out of Providence the route lies along the shores of Narragansett Bay to Fall River and New Bedford, thence around Cape Cod. Fall River and New Bedford, once famous whaling towns, are now the centres of some of the largest cotton goods manufacturing companies in the world. On the cape the principal industries are cranberry raising and fishing, although of late years it has become a popular summering place for people from all over the country. Returning from the cape via New Bedford a run is made through Tiverton to Newport, which is famous the world over as the social capital of America.

grims in 1620 and the rock on which the first Pilgrim set foot is still preserved beneath a beautiful canopy to commemorate the event.

In swinging back to New York the route runs directly across Massachusetts, through Worcester and Springfield, two manufacturing centres, and south across the western section of Connecticut through Hartford and Waterbury to Bridgeport. From the latter city, which is a thriving munitions city and boat building centre, the tour winds along Long Island Sound into New York.

There are many interesting features about these New England cities. Springfield is noted for its magnificent municipal buildings, a group in Court Square alone, costing \$2,000,000. An enormous clock tower, 300 feet high, stands in one of the squares and from its top one may look into the Connecticut valley. It has 12 bells, which chime the "Cambridge

with an area of 700 acres. In the State House there is a chair made from the famous Charter Oak in which the colony's charter was concealed. The famous Stuart portrait of Washington hangs in the capital.

Waterbury is a thriving industrial city where thousands of tons of brass are worked into finished products annually. One concern alone turns out over half a million watches annually, and another company has a like production. It is also a great button city and a big silverware corporation has its plant there.

ITINERARY. NEW ENGLAND-CANADA.

Night Stops—New York, Pittsfield, Mass.; Burlington, Vt.; Bretton Woods, Dixville, N. H.; Rangeley, Moosehead Lake, Bar Harbor, Me.; St. Stephens, St. John, Moncton, Fredricton, N. B.;



The Military Police in the Cantonments Are Skilled in the Ways of Traffic Control.

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Besides the many palatial summer residences and beautiful estates, there are numerous places of present day and historic interest. The government maintains a training school for marines in the city, a war college, torpedo station and Fort Adams, which protects the entrance to Narragansett bay, is on the outskirts. In one of the parks the Old Stone Mill still stands. This peculiar shaped structure has worried the historians for many years in accounting for its origin. Some contend that it was built by the early settlers, while others are of the belief that it is the only remaining trace in this country of the early explorations of Eric the Red, while still others think it antedated that period.

Where the Pilgrims Landed.

Another historic place in our country's early history, Plymouth, Mass., is reached on the next day's run. Here the Mayflower landed its sturdy band of Pil-

Quarters" of Handel.

Famous Arsenal at Springfield.

A U. S. Arsenal, where the famous Springfield rifles were made, is located in the city. During the Civil War 800,000 of these arms were turned out.

Hartford, the capital of Connecticut, is famous for its many well known insurance companies and the number of its sons that have found their way into the hall of fame. The constitution of the colony, which was settled in 1633 by Tom Hooker of Hartford, England, is said to have been the prototype of the Constitution of the United States.

The Colt Firearms plant, which made the name "Colt" a synonym for pistols the world over, is located in the city, and at present turns out the Colt automatic, which is standard equipment in the United States Army and Navy.

Relics at Hartford.

Hartford is a city of parks, having 17,

Houlton, Bangor, Portland, Me.; Concord, N. H.; Providence, R. I.; Provincetown, Mass.; Newport, R. I.; Plymouth, Springfield, Mass.; New York City. Twenty-two Days, 2553.5 Miles.

New York-Pittsfield.

Miles		Miles	
New York.....	0.0 Rhinebeck	88.6	
Yonkers.....	12.9 Red Hook.....	94.0	
Hastings-On-Hudson.....	Livingston	106.1	
Dobbs Ferry.....	17.4 Hudson	114.4	
Tarrytown	18.4 Claverack	118.9	
Scarboro	23.4 Mellenville	123.0	
Ossining	27.6 Ghent	129.3	
Harmon	29.3 Chatham	131.4	
Peekskill	32.0 New Concord.....	136.4	
Wappinger's Falls	40.8 East Chatham.....	137.5	
Poughkeepsie.....	Queechy, N. Y.....	143.1	
Hyde Park.....	64.9 Shaker Village, Mass.....	150.6	
	72.5 Pittsfield, Mass.....	155.3	

Pittsfield-Burlington.

Miles		Miles	
Pittsfield	0.0 Castleton	163.2	

Lanesboro	5.3 Cas'ton Corners	104.9
S. Williamstown	16.5 Hubbardton	112.0
Williamstown	21.5 Hyde Manor	117.7
Pownal, Vt.	25.9 Sudbury	119.0
Bennington	35.3 Whiting	123.6
S. Shaftsbury	40.6 Cornwall	130.5
Arlington	55.5 Middlebury	134.8
Manchester	58.5 Brookville	138.4
East Dorset	65.0 New Haven Junc-	
Danby	72.4 tion	143.9
Wallingford	81.8 Vergennes	147.7
Clarendon	85.2 Shelburne	163.5
Rutland	91.8 Burlington	170.4

Burlington-Bretton Woods.

	Miles	Miles
Burlington	0.0 Westmore	97.0
Essex Center	9.6 West Burke	107.1
Underhill	16.0 Lyndon Center	115.4
Cambridge	26.2 St. Johnsbury	
Jeffersonville	28.8 Centre	121.6
Johnson	37.7 St. Johnsbury	124.4
N. Hyde Park	43.2 Lower Wat'ford	134.0
Eden	47.2 Waterford	137.1
Westfield	63.7 Littleton	142.5
Troy	65.7 Bethlehem	147.4
Newport	76.2 Bethlehem Jct.	150.5
West Derby	77.4 Bretton Woods	161.0
W. Charleston	86.3	

Bretton Woods-Dixville.

	Miles		Miles
Bretton Woods.	0.0	Stratford Hol-	
Twin Mountain		low	37.6
House	5.4	North Stratford	46.1
Whitefield	14.0	Colebrook	59.3
Coos Junction..	23.9	Kidderville	66.0
Groveton, N. H.	32.6	Dixville Notch..	69.7

Dixville Notch-Rangeley.

	Miles		Miles
Dixville Notch.	0.0	Rumford	59.1
Errol	11.8	Ridgelyville	61.0
Upton, Me.	21.4	Dixfield	65.4
Newry	42.5	Weld	77.5
Hanover	47.7	Webb	79.8
Rumford Point.	49.4	Madrid	94.6
Rumford Center	53.7	Rangeley, Me.	109.8

Rangeley-Moosehead Lake.

	Miles		Miles
Rangeley	0.0	N. Cornville....	88.4
Dead River Sta.	4.5	Athens	90.4
Stratton	19.8	Brighton	99.0
N. New Portland	56.9	Kingsbury	104.9
North Anson	65.2	Blanchard	117.7
Lakewood	72.0	Greenville	132.3
Skowhegan	77.7	Greenville Jct.	133.7

Moosehead Lake-Bar Harbor.

	Miles		Miles
Greenville Junction	0.0	Kenduskeag	59.1
Greenville	1.6	Bangor	73.1
Monson	15.1	E. Brewer	73.8
Abbott	21.2	E. Orrington	79.6
Gulford	26.4	North Ellsworth	92.4
Dover	34.4	Ellsworth Falls	98.4
W. Charleston	46.1	Ellsworth	100.1
East Corinth	51.1	Mt. Desert Island	
		(Bar Harbor)	109.0

Bar Harbor-St. Stephen.

	Miles		Miles
Bar Harbor....	0.0	Harrington....	49.7
Ellsworth....	8.9	Columbia Falls..	54.6
Hancock....	18.9	Jonesboro.....	62.8
W. Sul'van Ferry	20.0	Machias.....	70.5
Sullivan.....	21.9	East Machias...	74.8
East Sullivan..	24.6	Baring.....	109.4
Gouldsboro....	31.5	Milltown.....	112.6
Stauben.....	36.4	Calais, Me.....	114.2
Millbridge....	42.0	St. St'phen, N. H.	114.9

Calais-St. Stephens-St. John.

	Miles		Miles
Calais	0.0	Musquash	66.3
Oak Bay	6.7	Spruce Lake	75.8
St. Andrews	20.3	Fairville	80.8
St. George	39.6	St. John	83.7
Lepreux	57.6		

St. John-Moncton.

	Miles		Miles
St. John.....	0.0	Pettitcodiac	71.2
One Mile House	1.5	River Glade.....	76.4
Rothsay	8.9	Salisbury	81.8
Hampton Station	22.4	Moncton	95.9
Sussex	45.2		

Moncton-Chatham.

	Miles		Miles
Moncton	0.0	Rexton	48.0
Cocagne	22.3	Richibucto	50.6
Bucktonche ...	33.3	Chatham	88.0

Chatham-Fredrickton.

	Miles		Miles
Chatham	0.0	Boiestown	65.0

Newcastle Ferry	4.6 Covered Bridge	83.0
Derby Jct.	8.3 Nashua	92.5
Millerton	12.6 Marysville	101.8
Blackville	28.3 Fredrickton, N. B.	105.8
Doaktown	49.6	

Fredrickton-Houlton.

	Miles		Miles
Fredericton ...	0.0	Temple	56.9
Long	16.9	Woodstock, N. B.	63.9
Prince William	22.3	Richmond Cor...	70.6
Hawshaw	37.7	Houlton, Me...	79.7

Houlton-Bangor.

	Miles	Miles
Houlton	0.0 W. Enfield	79.5
Linneus	8.6 Passadumkeag	84.4
Haynesville	24.6 Olamou	88.9
Macwahoc	44.1 Costigan	97.8
Matavameag	53.8 Old Town	103.5
Lincoln	67.6 Orono	108.4
S. Lincoln	72.0 Bangor	116.2

Bangor-Portland.

	Miles	Miles
Bangor	0.0 West Warren...	70.1
Hampden	6.0 Waldoboro	76.7
Winterport	13.0 Damariscotta...	87.2
Frankfort	15.8 New Castle	87.5
Prospect	19.9 Wiscasset	96.2
Searsport	28.9 Mount Sw eag	100.5
Belfast	34.3 Woolwich	105.7
Northport	42.1 Bath	105.7
Lincolnvill e	47.2 Brunswick	114.8

Seekonk, Mass.	4.5 W. Barnstable	72.9
Luther's Corners	12.8 Barnstable	76.0
Swansea	14.9 Yarmouth Port	79.0
Fall River	19.5 Dennis	83.5
W'port Factory	26.4 E. Dennis	85.5
New Bedford	32.7 Brewster	90.1
Fairhaven	34.6 Orleans	95.5
Mattapoisett	39.7 Eastham	99.4
Marion	44.7 S. Wellfleet	106.9
Wareham	50.5 Wellfleet	108.3
Onset	54.3 Truro	113.0
Sagamore	63.2 Provincetown	122.9

Provincetown-Newport.

	Miles	Miles
Provincetown...	0.0 Falmouth	78.5
N. Truro.....	6.3 N. Falmouth	85.8
Wellfleet.....	14.5 Mon'ment Beach	91.4
Eastham.....	23.5 Onset	97.6
Orleans.....	27.0 Wareham	101.4
Chatham.....	36.6 Marion	107.2
S. Harwich.....	41.8 Mattapoisett	112.2
West Dennis.....	48.9 Fair Haven	117.3
S. Yarmouth.....	49.7 New Bedford	119.2
Hyannis.....	54.8 W'tport Factory	125.5
Centerville.....	58.9 Bliss Cor., R. I.	132.1
Osterville.....	62.0 Tiverton	136.2
Marston's Mills.	64.3 Newport	148.4

Newport-Plymouth.

	Miles		Miles
Newport	0.0	Middleboro	45.4
Fall River.....	18.5	Mid'boro Green.	47.2



The Trophy of a Big Game Hunt in Northern Maine.

Camden	52.8 Freeport	123.3
Rockport	54.7 Yarmouth	129.0
Rockland	60.9 Falmouth	134.4
Thomaston	65.0 Portland	140.8

Portland-Concord.

	Miles	Miles
Portland	0.0 S. Berwick, Me.	44.4
Scarboro	5.7 Dover, N. H.	48.7
Saco	14.3 Barrington	58.5
Bliddeford	15.2 E. Northwood.	64.6
Kennebunk	24.4 Northwood	68.2
Wells	29.0 Epsom	76.6
North Berwick	38.0 Concord	86.4

Concord-Providence.

	Miles		Miles
Concord	0.0	Sudbury	71.0
Pembroke	5.8	Saxonville	76.2
Suncook	7.3	S. Framingham	79.9
Manchester	18.0	Sherborn	83.9
Merrimack	26.7	Medfield	90.0
Thornton's Ferry	30.2	Walpole	94.4
Nashua, N. H.	36.1	Wrentham	101.3
Tyngsboro, Mass.	42.5	N. Attleboro	107.7
Chelmsford	49.0	Pawtucket, R. I.	115.7
North Acton	57.7	Providence	120.0

Providence-Provincetown.

Miles		Miles	
Providence	0.0	Sandwich	65.2

Somerset	24.4 Waterville	50.3
Taunton	34.3 N. Carver	52.1
Hart's Corners	36.2 Plymouth	60.1

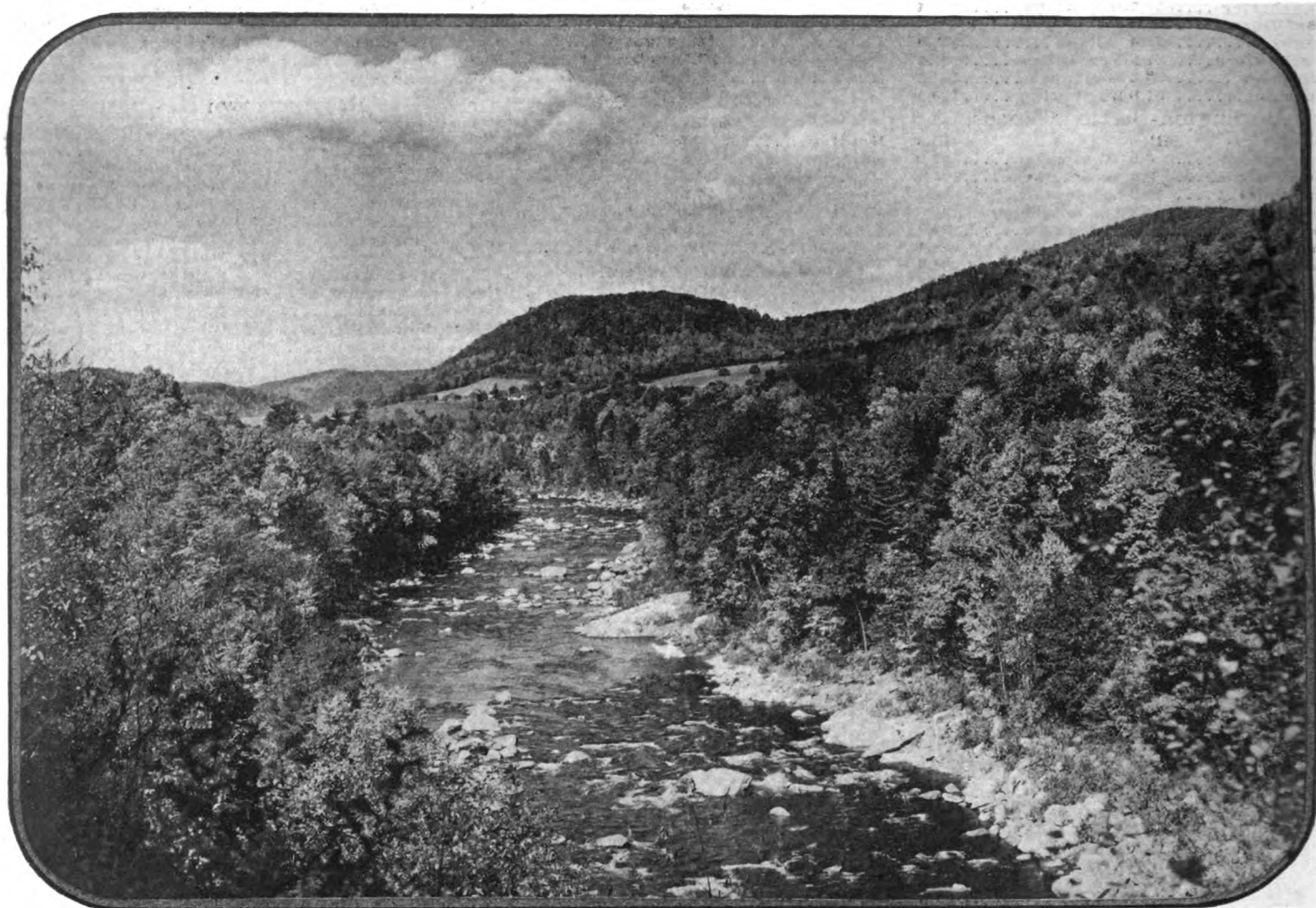
Plymouth-Springfield.

	Miles		Miles
Plymouth	0.0	Ashland	59.7
Kingston	4.5	Westboro	68.6
W. Duxbury	6.8	North Grafton	74.8
Hanover	13.7	Worcester	80.9
Whitman	21.4	Cherry Valley	85.1
Brockton	25.7	Spencer	91.9
Stoughton	31.9	E. Brookfield	95.8
Sharon	36.8	Brookfield	98.7
Walpole	42.0	Warren	104.9
Medfield	46.4	Palmer	116.5
Sherborn	52.5	N. Wilbraham	121.6
S. Framingham	56.5	Springfield	131.9

Springfield-New York City.

	Miles		Miles
Springfield	0.0	Sandy Hook	77.2
Windsor Locks	13.5	Newtown	78.7
Windsor	19.1	Danbury	88.1
Hartford	25.6	Ridgefield, Conn. . . .	97.4
Farmington	34.6	S. Salem, N. Y. . . .	101.2
Plainville	39.2	Bedford	110.2
Southington	43.9	White Plains	126.1
Plantville	45.5	Hart's Corners	128.5
Waterbury	56.1	Bronxville	134.4
Middlebury	61.7	New York	149.9

Circling Through New England



A Vista Through the Woods in the Valley of Deerfield River. A Scene from the Highway in Western Massachusetts.

ANOTHER tour which is designated on the route map as the "New England Tour," follows out the general direction of the New England-Canada trip, intersects it at a number of points, but passes through the more densely settled sections of the territory and touches the principal cities.

From the same starting point the route leads out of New York over the Old Boston Post Road, through the suburbs of the metropolis, where are found many old inns that have been doing business for a century or more. The remainder of the stretch along the sound to Bridgeport teems with places and points of historic interest.

In Greenwich, the first town in Connecticut, the highway passes the former home of General Putnam and further on at Darien is the scene of the capture of the Rev. Moses Mather and his congregation by the British in 1781. The little brick church over which he presided still stands by the roadside.

Traversing Rich Valley.

At Stratford the route turns northward into the Housatonic valley, leading into the Berkshires and passing through the manufacturing towns of Ansonia, Waterbury and Thomaston, where thousands of watches and clocks are manufactured

annually. Just before entering Canaan, where the Housatonic is reached, the route passes Haystack mountain, and at Ashley Falls and Sheffield the marble quarries are passed.

Great Barrington and Lenox, the latter in the heart of the beautiful Berkshire hills, are both well known summering places and contain some of the finest estates in New England. In addition to the natural beauty of the surrounding country, there are many examples of landscape gardening worked out in golf courses and gardens.

Similar country is encountered on the route to Williamstown, the site of Williams College, and near the city the road passes within view of Graylock Mountain, the highest peak in Massachusetts. Mountainous scenery of the most rugged type abounds throughout this section and the route passes over routes that were formerly mountain trails.

Fine Summering City.

Manchester, Vt., contains one of the finest golf links in the country, where championship matches are played each summer. It has been a popular summering place for many years. The Connecticut river is crossed on the fourth day, the road passing through the Peru mountain pass and many delightful villages

on to Sunapee Lake, N. H., 1104 feet above the sea.

Making the run into the White Mountains via Plymouth on the Pemigewasset river, the tourist strikes into the hills and mountains, their sides wooded with beautiful trees and shrubbery. Mt. Prospect, Mt. Welch and the Sandwich Mountains are visible from the road, also Livermore Falls and the Franconia Mountains, when Durgin's Hill is reached.

It is doubtful if a more beautiful stretch of roadside scenery exists than that witnessed passing through the Franconia Notch, which is five miles long and less than half a mile wide, laying in the western fringe of the Franconia Mountains. Along the heights above Ammonoosuc river to Bretton Woods, the famous Twin Mountains are passed.

Many Camping Sites.

Throughout this section the tourist will find ideal camping spots and magnificent mountain hotels and inns. Accommodations and facilities for enjoying all the forms of outdoor recreation and nature are at hand.

Crawford Notch, Glen Station and Intervale are the next scenic places reached in the order named. At Glen Station, which is near the Peabody river,



Looking to the Sea from the Mountain in the Sieur de Monta National Park on Mt. Desert Island, Near Bar Harbor.

the presidential peaks are in full view. On the road over Tug of War Hill, where the route enters the valley of the Saco river, is the Willey house, which was buried with its inmates by an avalanche in 1826.

Passing through the beautiful "Inter-vales" of the great ravine and on into Fryeburg and Bridgeton, a rolling country dotted with farms and lakes is encountered, and the topography continues of this character until Poland Springs is reached.

Entertainment in Variety.

Poland Springs is famous the world over for its mineral springs and a large hotel is located there, affording all the conveniences to be obtained in the large cities. The water that comes from the springs is reputed to have great curative powers and is exported to all parts of the world.

A few miles beyond the springs is Sabbath Day Lake, where there is a large colony of Shakers. From this point the route runs to the sea coast at Portland.

A bituminous concrete highway, running along the coast connects Portland with Portsmouth, and passes through many towns which are noted as the homes of famous authors. Kennebunkport and York are the summer homes of William Dean Howells, John Kendrick Bangs, Thomas Nelson Page, Peter Finley Dunne, Booth Tarkington and George Barr McCutcheon.

Amongst Seaside Resorts.

Old Orchard, one of the most noted sea side resorts in the country, is reached by a short detour off the main highway. The bathing beach at Old Orchard is 400 feet wide and stretches out evenly for a distance of 10 miles.

Portsmouth is the home of a number of well known writers and artists, including Thomas Bailey Aldrich. The Portsmouth Navy Yard is located at Kittery, where the Russian and Japanese envoys met to settle the war in which they

were engaged a number of years ago. The "Ranger," the famous privateer commanded by John Paul Jones, was built at Portsmouth.

Continuing southward along the coast line the highway goes through Newcastle, Newburyport, Salem, Lynn, Swampscott to Boston. Newburyport and Salem are old maritime cities, the latter being the oldest city of the commonwealth and was at one time the centre of the East India trade and the home of a group of great shipping masters. The house occupied by Roger Williams before he was banished still stands in the town. It was the scene of several of the witchcraft trials and a short ways outside the town is Gallows Hill, where 19 people were hanged because they were found guilty of witchcraft.

Many Cities of Industry.

Lynn, which was founded in 1629, is a great manufacturing centre, where electrical goods and shoes are produced. The

shoe business was started in the city in 1750.

Boston, the largest city in New England, has many historic buildings and places, including Bunker Hill monument, Faneuil Hall, Old South Meeting House, King's Chapel, Paul Revere's House and other points which were associated with the Revolutionary War period. Harvard University is in Cambridge, across the Charles river.

From Boston the route runs south to Providence, through Wrentham, North Attleboro and Pawtucket, and continues along the west shore of Narragansett Bay to Narragansett Pier, one of the famous summer resorts on the southern coast of New England. During the summer time thousands of people bathe in the surf daily.

On the road leading down to Westerly, which skirts the shore, is the birthplace of Oliver Hazard Perry, who won a brilliant victory in the war of 1812 at Put-In-Bay, O., on Lake Erie.

At several of the Connecticut cities, including Bridgeport, it is possible to ferry over to Long Island and make the remainder of the trip over one of the island routes given on the same map with this tour.

ITINERARY. NEW ENGLAND TOUR.

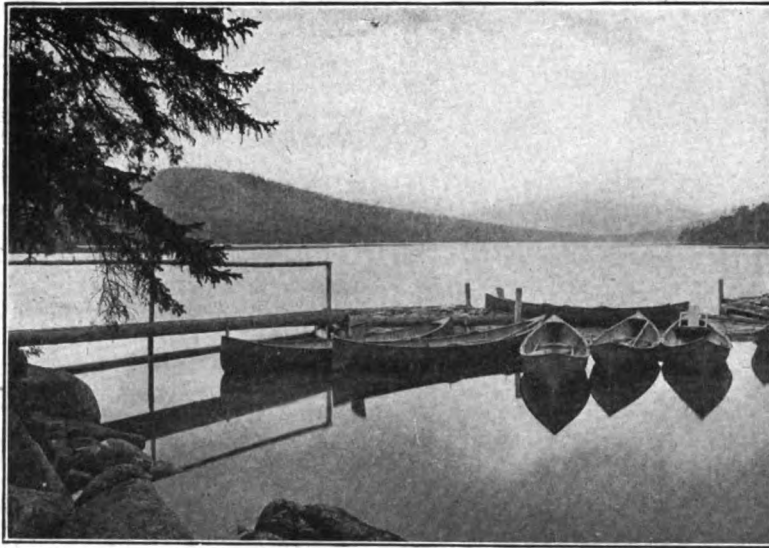
Night Stops—New York, Waterbury, Conn.; Lenox, Mass.; Manchester, Vt.; Sunapee Lake, Profile House, Bretton Woods, N. H.; Poland Springs, Me.; Newcastle, N. H.; Boston, Mass.; New London, Conn.; New York City. Eleven Days, 899.9 Miles.

New York-Waterbury.

	Miles		Miles
New York.....	0.0	Westport	44.7
New Rochelle..	17.7	Southport	51.0
Mamaroneck...	21.1	Bridgeport ...	57.3
Rye	24.8	Stratford	60.9
Port Chester..	26.5	Shelton	70.7
Greenwich	29.6	Derby	71.0
Stamford	34.7	Seymour	76.6
Darien	39.2	Naugatuck	83.9
Norwalk	43.4	Waterbury	89.0



Lake Sunapee in the New Hampshire Hills Reached on the Second Day of the New England Tour.



Kennebago Lake, in the Heart of the Maine Camping Region.

Waterbury-Lenox.

Miles	Miles
Waterbury 0.0	Canaan 43.1
Waterville 2.8	Ashley Falls... 45.3
Thomaston 9.8	Sheffield 49.4
East Litchfield 17.0	G't Harrington 55.6
Torrington 20.0	Stockbridge ... 63.1
Norfolk 35.4	Lenox 69.1

House 13.4	Crawford Gap. 21.8
Bretton Woods 18.8	

Bretton Woods-Poland Springs.

Miles	Miles
Bretton Woods 0.0	East Fryeburg. 47.5
Hartlett 18.6	Bridgeton 56.7
Glen Station.. 24.7	Naples 65.4
Intervale 28.8	Cooks Mills... 68.8

Dry Mills..... 8.2	Wells 54.7
Gray 10.9	Ogunquit 62.2
West Falmouth 20.8	Cape Neddick.. 65.5
Allen's Corners 24.0	York Beach... 68.2
Portland 27.7	York Harbor... 71.0
Scarboro 33.4	Kittery 79.2
Saco 42.0	Portsmouth ... 81.2
Biddeford 42.9	Newcastle 84.8

Newcastle-Boston.

Miles	Miles
Newcastle 0.0	Manchester-by-the-Sea 54.4
Eaton's Corners 19.7	Beverly Farms 59.1
Salisbury 23.6	Beverly 63.7
Newburyport.. 26.2	Salem 65.2
Newburyport	Old Town... 29.9
Old Town... 29.9	Swampscott ... 71.0
Rowley 34.1	Lynn 72.9
Essex 43.2	Somerville 85.2
W. Gloucester. 46.8	Boston 89.1

Boston-New London.

Miles	Miles
Boston 0.0	E. Greenwich.. 54.0
Dedham 10.8	Hamilton 65.1
Norwood 15.0	Narragansett
Walpole 19.1	Pier 75.9
Wrentham 26.0	Westerly 90.1
Plainville 30.8	Mystic 106.2
N. Attleboro.. 32.4	Noanck 110.9
Pawtucket 40.4	Groton 117.1
Providence 43.7	New London... 117.2
Apponaug 53.4	

New London-New York.

Miles	Miles
New London... 0.0	Milford 68.2
Flanders 6.3	Bridgeport ... 70.7
Lyme 15.9	Fairfield 81.2
Old Saybrook.. 26.4	Westport 82.8
Clinton 28.4	Norwalk 86.1
Madison 33.3	Darien 90.3



Winding Roads Cut Into the Sides of Wooded Hills Lead from the Berkshires into Vermont.

Lenox-Manchester.

Miles	Miles
Lenox 0.0	Pownal 35.8
Pittsfield 6.6	Bennington Cen. 42.1
Lanesboro 11.9	S. Shaftsbury. 47.2
S. Williamstown 23.3	Shaftsbury Cen. 50.5
Williamstown. 28.7	Arlington 57.0
Pownal Centre 33.3	Manchester ... 65.2

Manchester-Sunapee Lake.

Miles	Miles
Manchester ... 0.0	Springfield ... 38.9
Peru 11.5	N. Charlestown 48.0
Londonderry... 16.5	Newport 63.2
Simonville ... 23.9	Guild 65.8
Chester 30.6	Sunapee 69.3

Lake Sunapee-Profile House.

Miles	Miles
Lake Sunapee. 0.0	Bridgewater .. 36.5
Georges Mills. 2.9	East Hebron.. 41.4
New London... 7.9	Plymouth 50.2
Elkins 10.9	West Campton 57.3
Willmot Flat.. 13.2	West Thornton 63.8
West Andover. 16.3	Woodstock 67.2
Danbury 22.4	Profile House.. 81.2

Profile House-Bretton Woods-**Crawfords' Gap.**

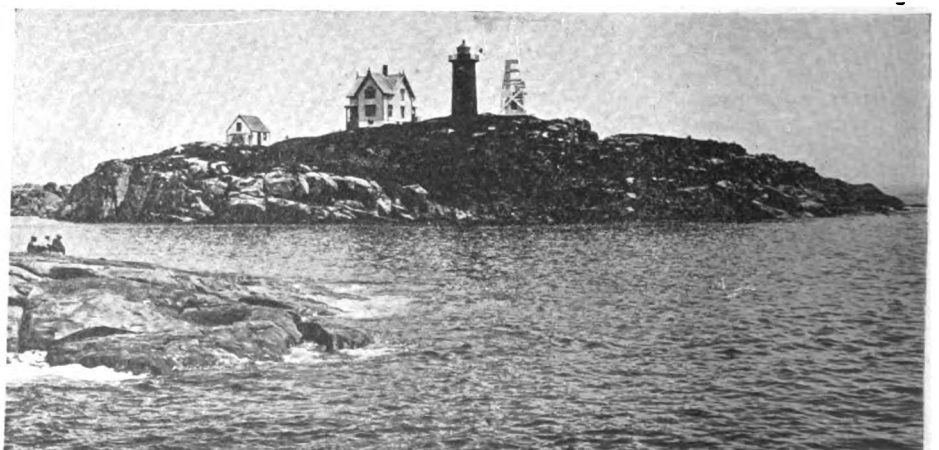
Miles	Miles
Profile House. 0.0	Mount Wash-ington 19.4
Twin Mountain	

Redstone 33.8	Webbs Mills... 73.3
Center Conway 36.5	Poland 81.4
Fryeburg 41.1	Poland Springs 84.7

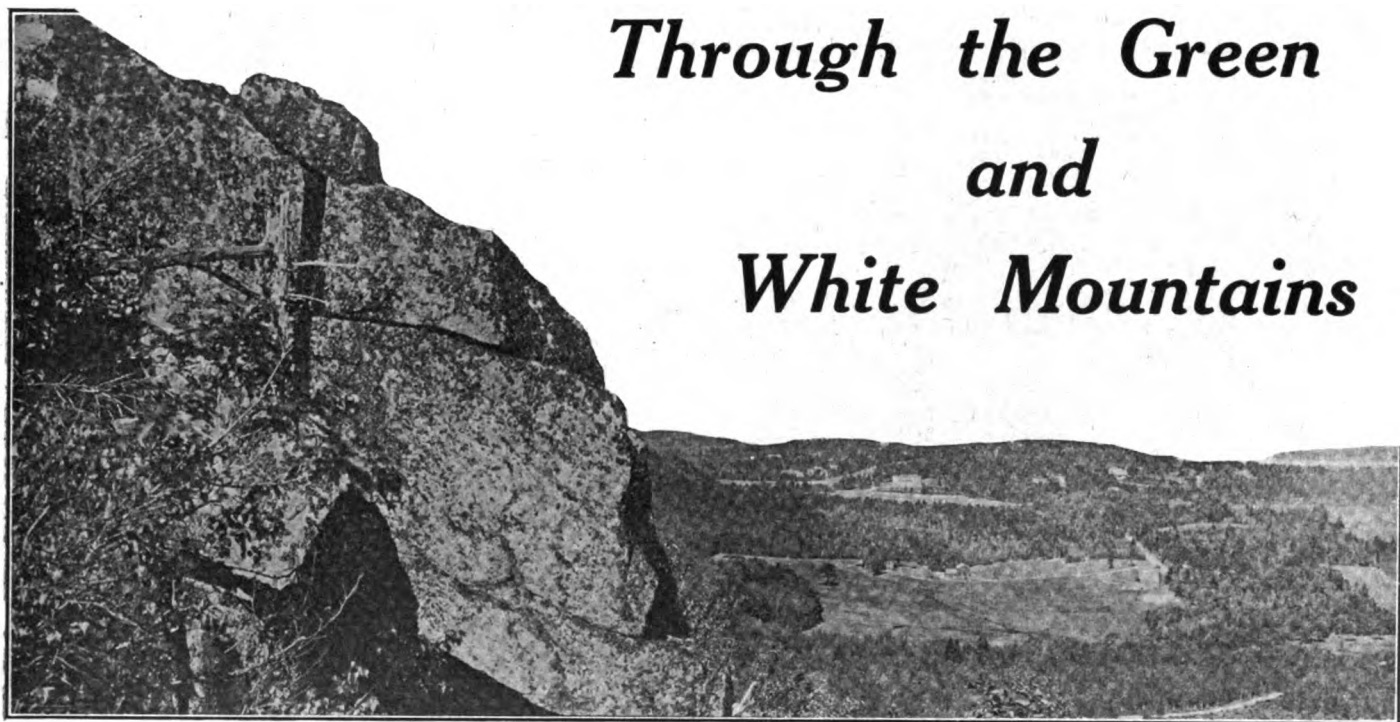
Poland Springs-Newcastle.

Miles	Miles
Poland Springs 0.0	Kennebunk ... 52.1

Gulfport 38.5	Stamford 94.8
Branford 47.5	Greenwich 99.9
East Haven... 50.8	Portchester ... 103.0
New Haven... 54.9	Rye 104.7
West Haven... 58.5	Larchmont 110.0
Savin Rock... 59.6	New Rochelle. 111.8
Woodmont 63.6	New York..... 128.5



Cape Neddick Light and a Mariner's Mark, the Nubble, Along the Coast of Maine.



Through the Green and White Mountains

A DELIGHTFUL trip, "through the Green and White Mountains," in Central New England, as the tour is called, can be conveniently covered within a week, permitting ample time for stops and detours to points of interest off the main route.

Running, first north and then south, the route leads through a section of New England that is visited by thousands of people during the summer time. Starting from Springfield the route crosses the Connecticut river into West Springfield and follows the west bank of the river into Holyoke, which is one of the large centres in the paper making industry.

Mt. Tom and later Mt. Holyoke comes into view passing onto South Deerfield. In the latter place there is a monument on Bloody Brook battlefield, where the memorable battle was fought Sept. 18, 1675. Beyond Greenfield the river is crossed and the route leads into East Northfield. At Mt. Vernon there is a great dam across the river, which formed a large lake in front of the town of Brattleboro, which is the business centre for a large part of New Hampshire and Vermont.

Putney, Vt., is known throughout the industrial world for its slate, which is found in two great veins. This product has been taken out for roofing purposes and school slates for many years.

Beyond Bellows Falls the river is crossed again and the route lies along the east bank to Claremont, where Ascutney mountain comes into view. At Ascutneyville the river is crossed again into Vermont and the route continues along the west bank of the river to White River Junction, where the night stop is made.

Following along the banks of the White river, which joins the Connecticut

at White River Junction, the route inclines westward to Bethel, where it turns north again into the Green Mountains and toward Montpelier, the capital of the state.

Through St. Johnsbury and Littleton, the first views of the Franconia and White Mountains are obtained. It is only a short run from Littleton into Bretton Woods, where there are excellent accommodations for motorists. Mt. Washington, the highest peak in New England, is close by. The view from the top on a clear day extends into five states and into Canada.

On the return trip the route is followed back to the Twin Mountain House, thence southward through the mountains to North Woodstock and Plymouth. The day's run ends at Concord. The final

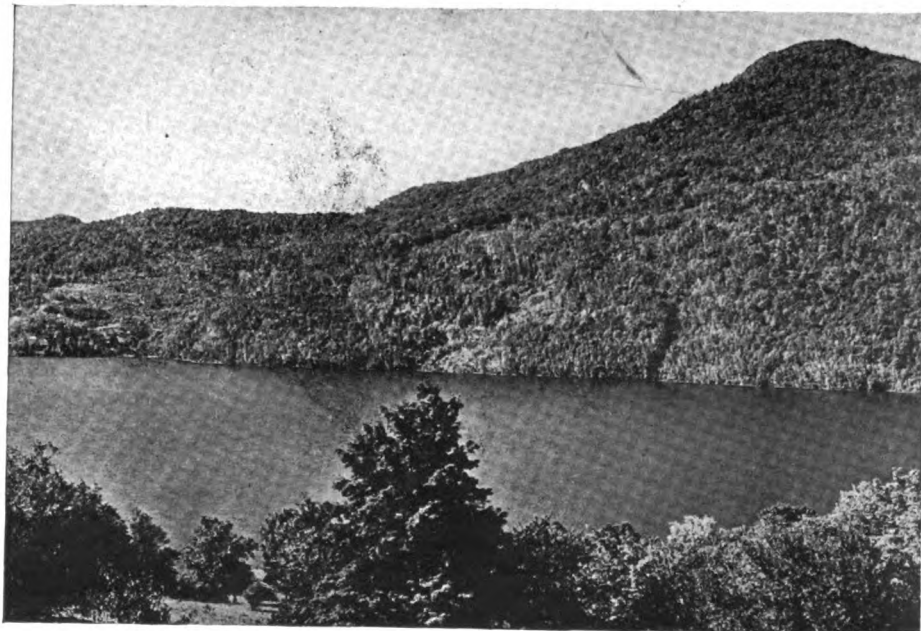
day's trip leads through Manchester, Nashua and Lowell into Boston.

ITINERARY. CENTRAL NEW ENGLAND.

Night Stops—White River Junction, Vt.; White Mountains, Concord, N. H.; Boston, Mass. Four Days, 440.5 Miles.

Springfield-White River Junction.

	Miles		Miles
Springfield.....	0.0	Bellows Falls..	79.4
Holyoke	8.7	S. Charleston..	82.9
Northampton..	17.7	Charleston	86.7
South Deerfield	28.5	Claremont	97.5
Deerfield	33.7	W. Claremont..	100.2
Greenfield	36.9	Ascutneyville..	102.4
Bernardstown..	43.3	Windsor	107.7
Gulford	54.4	Hartland	112.4
Brattleboro ...	57.2	N. Hartland...	117.0
Putney	66.4	White River	
Westminster...	74.4	Junction	122.6



Lake Memphremagog, a Noted Summer Place in Vermont.

White River Junction-White Mountains (Via Montpelier).

Miles		Miles
White River Junction.....	0.0	E. Montpelier..... 64.1
Hartford.....	1.6	Plainfield..... 68.2
W. Hartford.....	7.5	Marshfield..... 74.6
Sharon.....	13.5	Molly's Falls... 76.4
Royalton.....	20.5	South Cabot... 79.2
E. Bethel.....	25.8	Danville..... 87.9
S. Randolph... 27.3		St. Johnsbury. 95.2
		Lower W'ford. 105.9

E. Randolph... 30.8	Waterford..... 109.2
E. Brookfield.. 37.2	Littleton..... 114.7
Williamstown.. 44.8	Bethlehem..... 119.7
Barre..... 50.5	White Mount's 127.9
Montpelier.... 57.0	

White Mountains-Concord.

	Miles		Miles
White Mount's	0.0	The Weirs.....	72.8
Woodstock....	33.2	Lake Port.....	77.4
West Thornton	37.4	Laconia	79.1
West Campton	42.9	Tilton	88.4

Plymouth..... 50.4	Franklin Falls 91.4
Ashland..... 56.3	Franklin..... 92.3
Holderness... 60.3	Penacook..... 104.4
Meredith..... 68.1	Concord..... 110.5

Concord-Boston.

	Miles		Miles
Concord	0.0	Nashua	34.6
Pembroke	5.9	Lowell	51.3
Suncook	7.3	Burlington ...	62.9
Manchester ...	18.7	Cambridge ...	73.9
Merrimac	27.1	Boston	76.7

Over the Old Mohawk Trail

IN SOUTHERN New England are many pretty places or more than passing interest aside from the numerous historical points for which the section is famous. A tour through this territory, including a trip over a section of the old Mohawk Trail, is especially attractive on account of the excellent highways that are encountered throughout the entire distance, most of them in fact being of the most modern type of construction and recently built.

The first leg of the tour, leading out of Boston, is particularly interesting, as it passes through places rich in historical interest in connection with events in the

The route this far is also the main route to Camp Devens from Boston. At Littleton Common the route marked Fitchburg leads to Ayer, a distance of approximately seven miles.

Beyond Groton, the next place of importance is Keene, N. H. From this point the route leads southward along the Ashuelot river to Hinsdale, where it follows the east bank of the Connecticut river into Greenfield, Mass. The Mohawk Trail begins at Greenfield and leads over to the Hudson river. It is said that the Indians marked the trail in King Philip's time and used it in going from the Connecticut river to the

Willimantic and Putnam. The route follows the Hockanum river from Hartford to Manchester, passing the picturesque Bolton Notch, and then descends into the valley of the Hop river.

In Rhode Island the route passes through the quaint old villages and over rolling roads into Providence, past the beautiful State House on Capital Hill, which was designed by Stanford White, and cost over \$8,000,000. From this point the tourist can also look down the hill on the mammoth plant of the Brown & Sharp Mfg. Co., where over 6000 mechanics are employed in turning out the company's widely known machine tools.

Brown University, one of the oldest institutions of learning in the United States, is located on College Hill, in Providence, and can be reached by a short detour in passing through the city.

ITINERARY.

MOHAWK TRAIL.

Night Stops—Boston, Mass.; Keene, N. H.; Williamstown, Mass.; Hartford, Conn., and Providence, R. I. Four Days, 349.7 Miles.

Boston-Keene.

	Miles		Miles
Boston	0.0	Townsend	42.4
Cambridge	3.6	West Townsend	45.4
Arlington	6.9	Ashby	50.9
Lexington	11.9	West Rindge	62.9
North Acton	25.4	Jaffrey	68.9
Littleton C.	28.3	Marlboro	82.9
Groton	35.2	Keene	87.5

Keene-Williamstown.

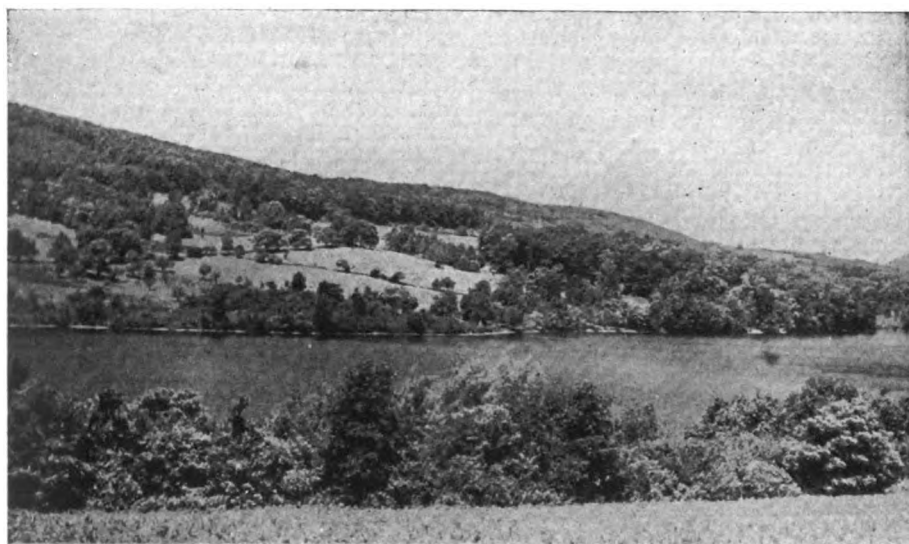
Miles		Miles
Keene	0.0	Greenfield 39.9
W. Swanscy	5.4	Shelburne 44.3
Westport	7.8	Shelburne Falls 48.1
Winchester	13.1	Charlemont 56.8
Hinsdale	18.5	Whitcomb 68.1
E. Northfield	25.3	North Adams 75.4
N'field Village	26.3	Williamstown..... 80.8

Williamstown-Hartford.

	Miles	Miles
Williamstown..	0.0 Ashley F., Mass.	52.3
S. Williamstown	5.4 Canaan, Conn.	54.5
Lanesboro	17.0 Norfolk	61.9
Pittsfield	22.3 Winstead	71.3
Lenox	28.9 New Hartford..	78.6
Stockbridge	34.8 Canton	84.3
G. Barrington..	42.2 Avon	88.6
Sheffield	48.3 Hartford	97.4

Hartford-Providence.

	Miles		Miles
Hartford	0.0	Pomfret Center	49.8
Manchester Cen.	8.7	Pomfret	51.9
Bolton Notch..	13.0	Putnam, Conn..	55.3
Andover	18.7	Chepachet	68.6
Willimantic ...	28.0	Harmony	72.3
Phoenixville ...	42.5	Providence	84.6



Prospect Lake, One of the Famous Spots in the Berkshires.

Revolutionary War. Out Commonwealth avenue to Cambridge the Harvard yard is passed and the Washington Elm, under which Washington took command of the Continental Army, and beyond Arlington is Lexington, where the first battle of the war for independence was fought.

Many towns and villages passed through that have been in existence since colonial times are more or less linked with the history of the country. Concord, which is probably best known as the home of the luscious grapes of that name, is also famous as the home of eminent authors past and present. The Grapevine cottage, where is the arbor on which Concord grapes were first grown, stands by the highway. Ralph Waldo Emerson, Nathaniel Hawthorne and Thoreau made their homes in the town and the houses in which they lived are still standing.

Hudson. The route of the tour passes over the trail as far as Williamstown, Mass., long winding grades through Shelburne Falls and Charlemont, up the eastern slope of Hoosac mountain to Whitcomb Summit, make it one of the most beautiful stretches of road in the country.

Williamstown, situated on the Green and Hoosac rivers, is the seat of Williams College. It is one of the most beautiful little residential towns in New England.

The route south to Great Barrington, which lies through Pittsfield and Lenox, was described in the "New England-Canada" tour. From Great Barrington the tourist swings eastward through Winstead, Conn., into the Connecticut valley at Hartford.

The last leg of the tour from Hartford to Providence crosses through the heart of Connecticut, touching Manchester,

The Valleys of The Appalachian Mountains

Wonderful scenery and driving conditions are found in a tour through the eastern mountains, from New York City through the northern border of Pennsylvania along the Delaware river, the Catskills and Adirondack mountains. Through the Jersey cities of Newark, Madison and Morristown modern boulevards are traversed. From Norristown, historically renowned as the winter quarters of General Washington during the winter of 1779-80, the road ascends Schooley's mountain, which was once a popular summer resort, overlooking the Musconetcong and German valleys.

Down the western slope of the mountain the road leads into Hackettstown, continuing on to the Delaware river, which is crossed by ferry. Following along the west bank of the river the route leads into the Delaware Water Gap, a famous summer resort in the Allegheny mountains.

Going over the route from the gap to the summit of Mt. Pocono and across the Pocono mountain plateau, the scenery is exceptionally fine. The descent of the mountains begins a short distance beyond this point and the route lays over a fine boulevard into Scranton, the center of the anthracite mining regions.

Up through valleys, walled in by wooded mountains, the road runs back into New York state and on to Binghamton. Passing out of this city through the Susquehanna river valley the country takes on an agricultural aspect.

All along the highways to Watkins Glen, which is nationally famous for its scenic beauty, there are many places of interest and continuing on through the lake country, along the south shore of Canandago lake and through the basin of Otsego lake, the foliage is dense.

From Cooperstown the route skirts the shores of Otsego lake and passes over the hills into the Mohawk Valley at Fort Plain. The drive through the valley and up the step hill to Ballston Spa is considered one of the finest routes in New York state. It is a short trip to Saratoga Springs, which was once the most popular resort in America, and Lake George is reached over an excellent stretch of highway.

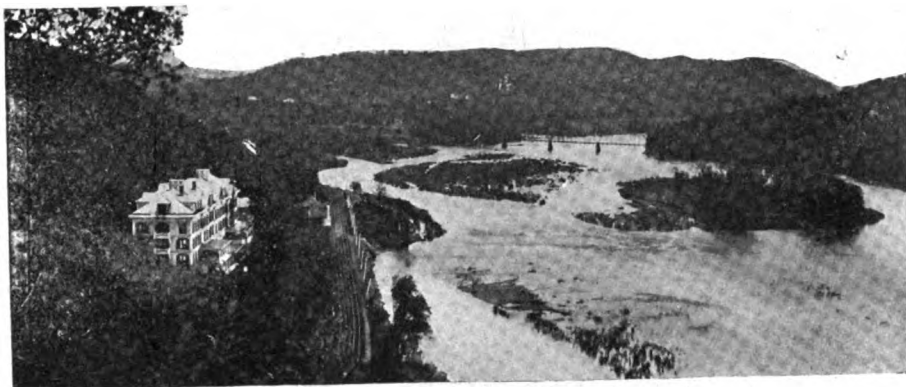
The return trip is made over the same route back as far as Ballston Spa, thence to Schenectady and Albany. From this point down the Hudson valley the route is similar to that given in the Plattsburg tour.

ITINERARY. EASTERN MOUNTAINS.

Night Stops—Delaware Water Gap, Penn.; Watkins, Cooperstown, Sagamore, Albany and New York. Seven Days, 730.8 Miles.

New York-Delaware Water Gap.

	Miles	Hackettstown...	Miles
Weehawken			53.8
Ferry	0.0	Danville	59.2
Newark	10.6	Buttsville	65.5
Irvington	12.9	Bridgeville	66.7



Delaware Water Gap, Looking Up River from Heights Above Kittatinny Hotel.

Madison	23.9	Delaware	72.3
Morristown	30.2	Myers Ferry	72.7
Mendham	37.1	Portland, Penn.	75.6
Chester	42.7	Delaware Water	
German Valley	47.4	Gap	80.9
Delaware Water Gap-Binghamton.			
	Miles		Miles
Delaware Water		Wallsville	66.8
Gap	0.0	Glenwood	73.1
Stroudsburg	3.6	Hartford	83.4
Mt. Pocono	19.9	New Milford	90.6
Tobyhanna	24.9	Broad Bend,	
Gouldsboro	30.5	Penn.	97.4
Scranton	52.7	Kirkwood, N. Y.	103.0
Providence	55.5	Binghamton	112.0
Clark's Summit	60.3		

Binghamton-Watkins Glen.

	Miles		Miles
Binghamton	0.0	Cayuta	56.9
Vestal	10.3	Alpine	59.9
Owego	24.6	Odessa	64.0
Candor	35.1	Watkins Glen	70.1
Van Etten	47.0		

Watkins Glen-Cooperstown.

	Miles		Miles
Watkins Glen	0.0	Truxton	60.8
Montour Falls	2.8	De Ruyter	69.0
Odessa	6.0	Ostelle	79.6
Alpine	9.9	Smyrna	88.2
Ithaca	27.7	Edmonton	106.2
Varna	31.6	Burlington	112.9
Willow Glen	36.5	Fly Creek	120.5
Dryden	39.3	Cooperstown	126.2

Cortland 49.4

Cooperstown-Sagamore.

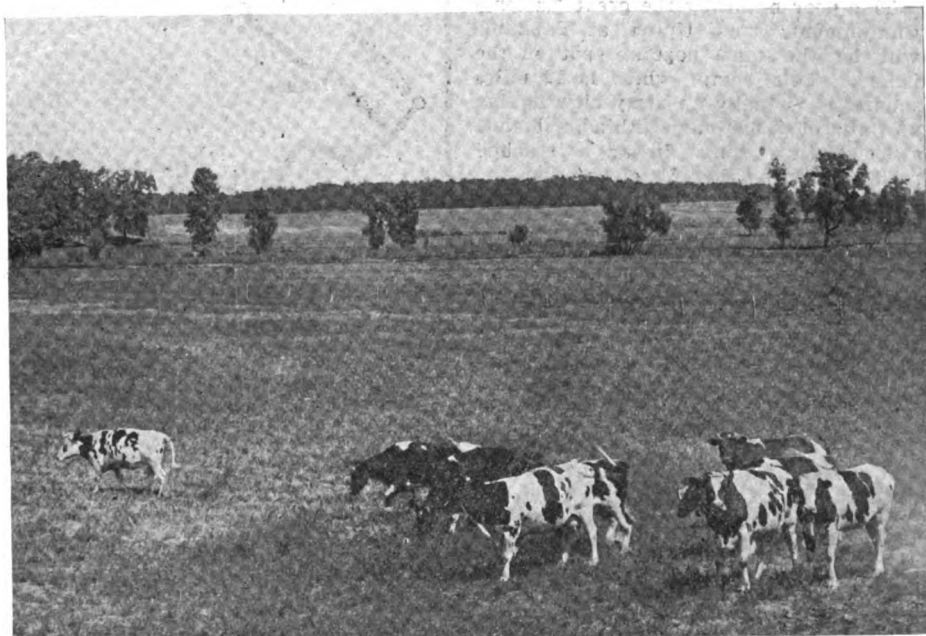
	Miles		Miles
Cooperstown	0.0	Tribe Hill	55.5
Springfield	10.3	Amsterdam	57.3
Cherry Valley	16.9	Ballston	79.5
Sharon Springs	24.5	Saratoga	86.2
Ames	28.2	S. Glens Falls	104.6
Canajoharie	34.7	Glens Falls	105.3
Palatine Bridge	35.2	Lake George	114.4
Fonda	46.6	Sagamore, N. Y.	120.4

Sagamore-Albany.

	Miles		Miles
Sagamore	0.0	Ballston	41.0
Lake George	6.0	Burnt Hills	48.6
Glens Falls	15.2	Schenectady	56.9
S. Glens Falls	15.9	Albany	71.9
Saratoga	34.3		

Albany-New York City.

	Miles		Miles
Albany	0.0	Hyde Park	68.5
Rensselaer	1.0	Poughkeepsie	74.5
Schodack Cen-		Wappinger Falls	82.2
ter	7.2	Hughsonville	83.6
Kinderhook	20.6	Fishkill Landing	89.7
Stuyvesant		Cold Spring	96.7
Falls	24.4	Peekskill	108.7
Stockville	29.7	Croton-on-Hud-	
Hudson	33.1	son	117.3
Blue Stores	43.3	Ossining	120.0
Upper Red		Tarrytown	125.2
Hook	49.8	Yonkers	137.4
Red Hook	52.3	New York, N. Y.	149.3



Herds of Blooded Dairy Stock Graze Along the Pastures.



Montauk Point Light, on Famous Atlantic

Headland, at Eastern End of Long Island.

On Long Island's Boulevards

TOURING on Long Island is motoring in the highest sense of the word, as it combines the satisfaction of perfectly maintained highways, the pleasure of seacoast and inland scenery effects while passing among some of the finest estates in the world, with examples of landscape gardening equal to any found in Europe. This type of environment is not found in only a few sections of the island, but is general from one end to the other.

While the main routes are reached over the various bridges from New York City to Brooklyn, there are several ferries leading from points in Connecticut which are extensively used by motorists coming from New England, New York state or the West.

This year naturally the great National Cantonment, Camp Upton, at Yaphank, will be the most popular spot on the island. This camp, which is 12 miles square, is virtually an army city, having upwards of 45,000 men within its boundaries under training. It can be reached readily from either Patchogue on the route going eastward or from Port Jefferson, which is on the northern coast of the island. The road connecting these two points which crosses the island passes through Medford, where a turn is made to the East. The roads leading to the cantonment are all marked with signs and no difficulty is experienced in finding the way, as the bulk of the traffic on the roads in that section flows either to or from Camp Upton.

The island, which is called New York's greatest suburb, is the home of more wealth for its size than any other section of the country. It is also famous as the home of many of America's greatest authors and artists, and its beautiful spots of interest and scenery have been reproduced on canvas for posterity.

It is a great summer playground and

has many watering resorts, with excellent accommodations for the tourist at convenient points. Short but interesting ferry trips are included in the run and the Connecticut shore may be reached by ferry from Sag Harbor, Shelter Island, Greenport and Port Jefferson. The accompanying itinerary, however, gives the places and mileages for a continuous trip from Long Island City, which is reached from New York via Queensborough bridge and return. Two

days' motoring will comfortably encircle the island, which is little more than 200 miles in circumference.

ITINERARY. AROUND LONG ISLAND.

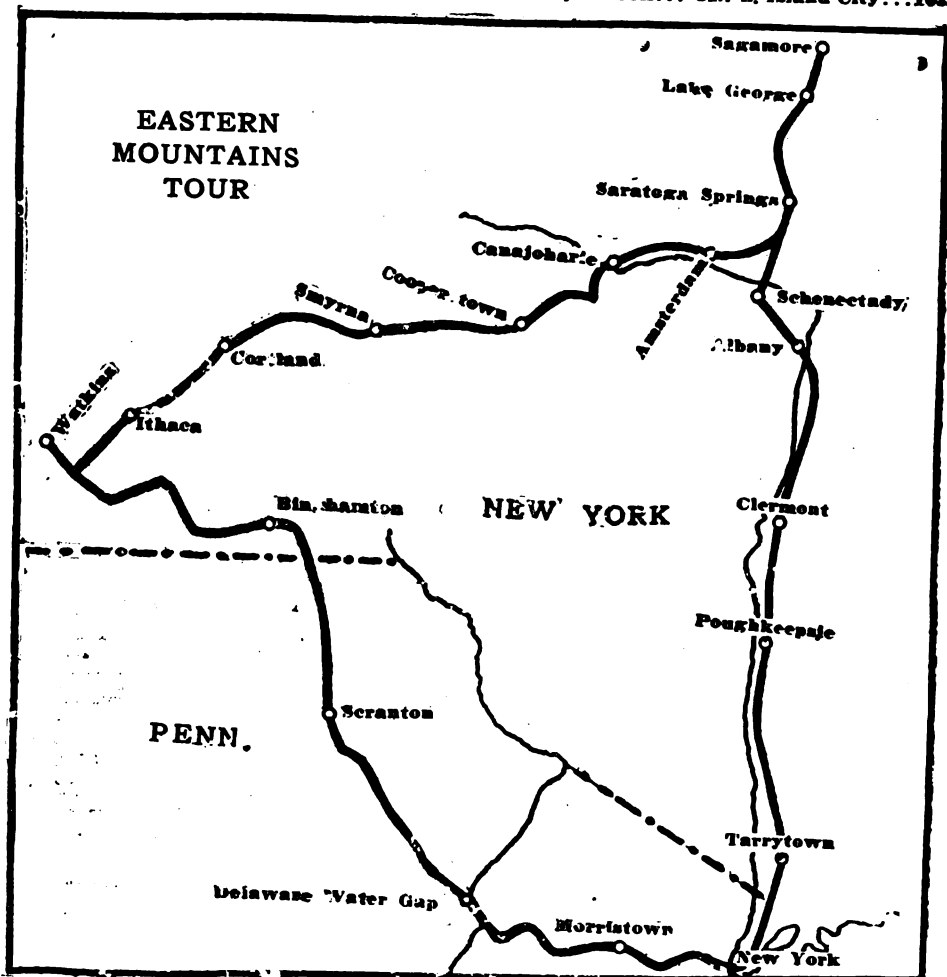
Night Stops—Greenport, N. Y.—Two Days, 218.5 Miles.

New York City—Greenport.

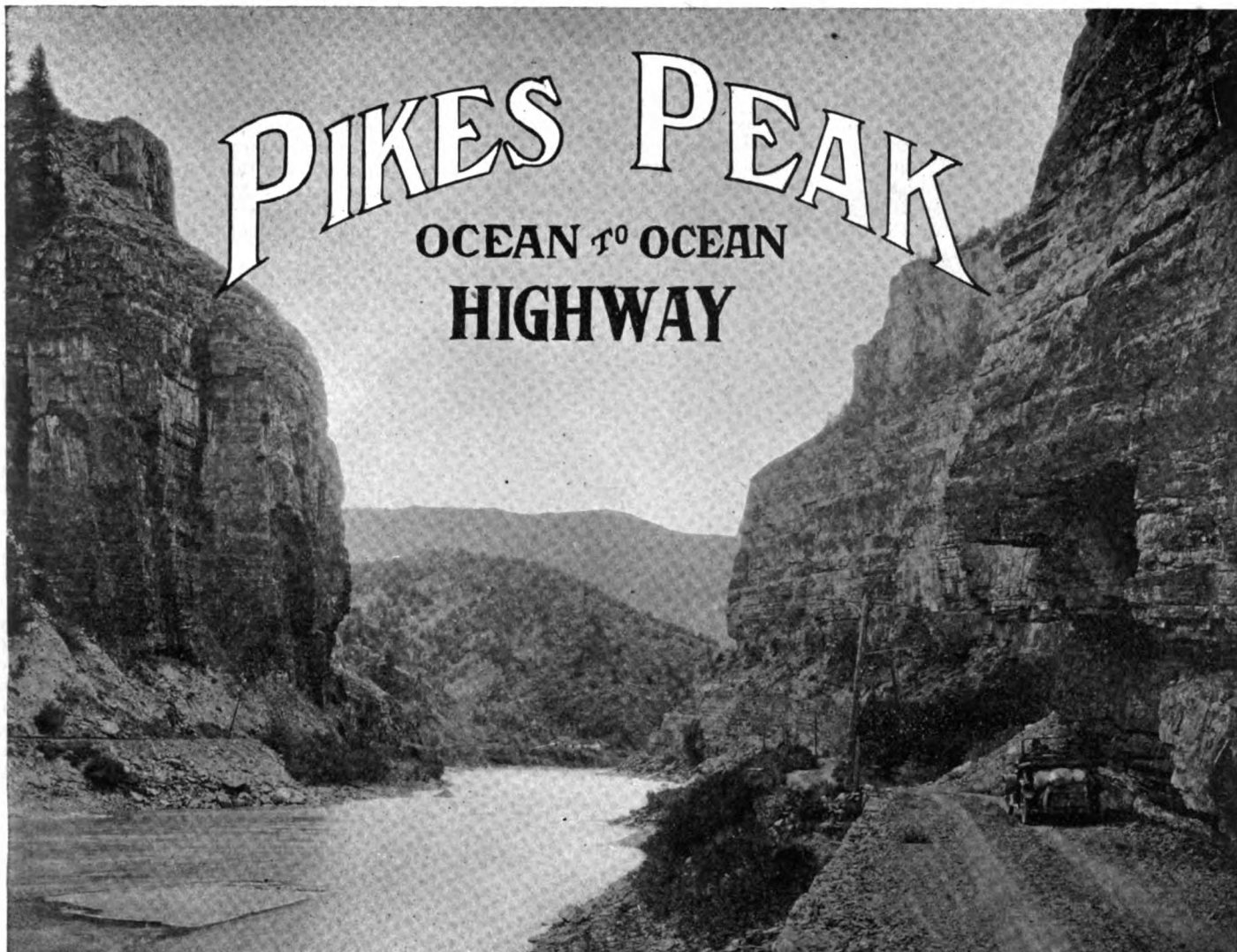
Miles		Miles	
L. Island City..	0.0	Bayport	51.6
Jamaica	8.8	Blue Point.....	53.3
Springfield	11.7	Patchogue	55.1
Valley Stream..	14.4	Bellport	59.4
Lynbrook	16.3	Moriches	67.3
Rockville Cent'r	17.6	East Port	72.8
Baldwin	19.5	West Hampton..	79.3
Freeport	21.2	Quogue	82.3
Merrick	22.8	Good Ground	86.6
Amityville	30.0	Southampton ...	95.7
Babylon	35.5	Bridgehampton..	102.4
Bay Shore	40.3	Sag Harbor.....	107.3
Islip	42.1	Shelter Island..	112.8
Oakdale	47.0	Greenp't Ferry..	115.0
Sayville	50.1	Greenport	115.1

Greenport—New York City.

Miles		Miles	
Greenport	0.0	St. James.....	54.0
Southold	4.7	Commack	62.3
Pecanic	8.0	Northport	68.2
Cutchogue	9.7	Centerport	69.4
Matituck	12.7	Huntington	72.6
Jamesport	16.7	E. Norwich.....	79.0
Riverhead	22.1	Roslyn	85.8
Wading River..	32.1	Manhasset Hills	88.7
Miller's Place..	41.7	Little Neck.....	91.4
Port Jefferson..	46.4	Bayside	92.3
E. Setauket....	48.3	Corona	98.7
Stony Brook...	51.7	L. Island City...	102.4



Map Showing a Triangular Tour of Eastern Mountains on the Appalachian Chain.
For Main Highway Connection See Page 15.



A Main Route to Several Western Cantonments

(By WALTER B. MONTGOMERY.)

"See America First" is bound to be the slogan of every automobile tourist for this year and as many years to come as the war lasts. Ocean travel and European sight seeing being prohibited for the time being, at least, there is going to be a decided impetus to interstate and cross country touring.

One of the finest highways of any length in the United States is the Pike's Peak Ocean to Ocean Highway. With the route surfaced practically all the way from New York to Hannibal, Mo., it holds the record for continuous paving. It extends from New York to San Francisco on as straight a line as geographical conditions permit. It traverses in its hundreds of miles the most typical American scenery, taking a center course through North America from East to West. To the native American or to the foreign pleasure seeker no trip by rail or motor could depict so many varieties of atmospheric or geographical conditions, not so many and extensive forms of agriculture. At times the motorist on the Pike's Peak spins along on a surfaced highway as smooth and level

as his own kitchen floor, where mammoth trees are literally as old as the hills. Again he will be confronted with a mountain road that twists crazily upward between flower bordered aisles. Then through the irrigated section where the sombre dreariness itself has a fascination form of charm, but it is all a part of the wonderful journey on the Pike's Peak, and not a mile but what discloses some new wonder to the eye and has its own peculiar attraction for the motorist. A trip from one end of the highway to the other any time from June to October will never be forgotten. All sorts of growing things are at their best and nature seems to take a pride in the beautiful highway by adding to it such splendid brilliancy of color as only the Divine painter could mix.

The highway continues each succeeding year to add considerable to its paved portion, and this has been an incentive to the improvement of hotels and taverns along the way, so that accommodation of the best may be had in the smallest village. Besides good hostleries the towns have first class garages and sup-

ply stations, and the tourist who observes religiously the speed regulations is assured of courtesy and consideration; but woe to him who enters a small town at more than 10 miles per hour. He may as well pay his fine cheerfully and depart, for he is a marked man.

Several army cantonments are located at places slightly off the Pike's Peak right of way, and make highly interesting side trips if one has the time and disposition to drive out of the way. The camps are now full of troops and resemble community cities, with their rows of barracks for enlisted men and the officers' quarters. There is training and drill daily from the prosaic manual of arms to heavy artillery practise. The camps are open to inspection by the public and offer an interesting diversion from the monotony of constant traveling. Funston is located west of St. Joseph and south, within about 50 miles of the highway. Camp Dodge is almost due north 100 or so miles and Camp Doniphan is the farthest of all and perhaps would be too far out of the way unless the tourist were particularly interested.

A great deal of paving is being done in Illinois and Ohio and these handsome surfaced roads are strong arguments in their own favor. There is very little doubt but what if every antagonist of paving of public highways could ride along over one of these stretches and see the traffic, both pleasure and commercial, that is possible on them in all kinds of weather, he would be convinced completely of their absolute worth. It is the aim of the Pike's Peak Highway Association to have constructed in the course of the next few years a continuous surfaced road from New York to San Francisco. The association is sparing no time, money or effort to inculcate into the people along the highway the urgent need for immediate paving, and it is to be hoped that a road available for public service 365 days of the year will be the result.

The first town of prominence in this state is Reading, and from there is a spur on the trail leading southeasterly to Philadelphia. If you are coming from New York this necessitates a sort of doubling back, but if you have plenty of time it will pay you to visit this historical old town. You will see the towering statue of William Penn, where he looks down on the city he loved so well. There are Revolutionary land marks galore, and romance ages old pervades the atmosphere.

When you reach Tyrone and Altoona you are apt to look back on Harrisburg as a modern town after all. These little old fashioned towns are numerous in each state and while some make an effort to emulate their neighboring big city, still they are, as a rule, charmingly out of date.

Pittsburgh is the most commercial city in Pennsylvania. It is generally known as the Smoky City on account of the fog, dirt and smoke that fill the air all day long. It is the most metropolitan city between New York and Chicago. The steel plants are its main source of wealth.

The finest roads of the entire trip are found in Ohio, and they are very busy this year with additional paving. The country is flat and the roads are frequently referred to by the rural inhabitants as "pikes." From Steubenville on the eastern boundary you proceed to Coshocton. Newark is a pretty little town and is situated within an hour's ride of Columbus, the state capital, which is noted for its wide streets and

The same scenes and the same charms exist in many sections and what strikes one person as particularly beautiful or worth while, does not make any appeal to his companion.

Decatur, almost in the exact center of the state, enjoys the distinction of being placed where the Grand Army of the Republic was organized, April 6, 1866, by B. S. Stephenson.

Near Hannibal, it will be recalled, was the birthplace and boyhood of Mark Twain, and where the scenes of his immortal Huckleberry Finn and Tom Sawyer were laid. The old town well and the cave where Tom played bandit are shown to visitors.

The highway through Missouri strikes a town every few miles, there being but one other state located on the highway where the towns are more numerous and then they are not so close together. Leaving Hannibal you encounter in quick succession Monroe, Shilbina, Macon and Brookfield.

Passing through a series of small towns the tourist finally comes to St. Joseph, that town rich in romance and redolent of the early gold expeditions, when it was "Pike's Peak or Bust." Here it was that the Pony Express was inaugurated and a brass tablet commemorates the spot where the first rider left on his famous ride. St. Joseph was an outfitting station for the pioneers and some of the old taverns still standing could relate queer tales if they possessed the power of speech.

Crossing the Missouri river you enter the decadent town of Elwood, Kan.,

which, strange to say, was at one time a keen rival of St. Joseph. The ravages of the river have all but destroyed the original town. The inhabitants are quiet folk who industriously tend their alfalfa in a serenity that is equaled only in the Mormon district further on. The first steam engine put on Kansas soil was fired for her initial trip at Elwood on April 24, 1860, amid the wild cheer-



Many of the Cantonments Are Located Amid Beautiful Scenery.
(Copyright by Committee on Public Information.)

civic pride.

Conservative Richmond is the first Indiana town. Indianapolis, capital of the state, has many attractions for the stranger, and is the largest Hoosier town on the highway.

In Illinois the Pike's Peak trail starts at Chrisman, then through Hume. The little village of Newman is like scores of other small places on the highway.

ing of the assembled populace. John Warburton, veteran of the 13th Kansas Civil War, is the only man living who helped to put Old Albany on the track.

Around Wathena and Troy is some of the most prolific fruit and berry land in the world, and it is always a problem to get men and women to help harvest the crop. Shippers from the entire United States come here and buy the crop on the trees.

After leaving the fruit country one probably considers Kansas lacking more or less in beauty, unless it be that general charm connected with rich soiled, well cultivated farm land. This agricultural charm is nearly universal, but eastern Kansas is perhaps best worth seeing.

Then, too, this eastern portion has seen a stirring past and it is a pleasure to recall the wild incidents of the anti-slavery struggle and of the Civil War in the vicinity where these events occurred. The highway passes through Troy.

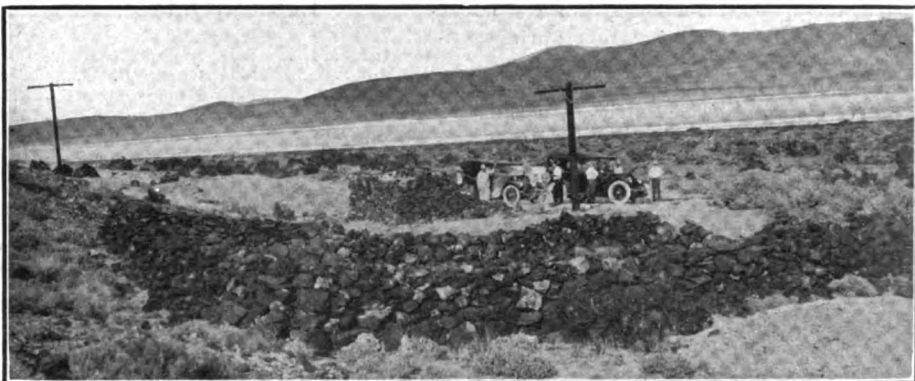
Belleville is where Lieut. Zebulon Montgomery Pike, leading a small exploring party of United States soldiers, camped en route to discover the peak which bears his name. Histories say that he left a large American flag at this point. Colby and Goodland are in the short grass section, where ranching is the picturesque occupation of almost the entire population.

On account of the numerous summer resorts and natural beauty of scenery, Colorado will perhaps delight the tourist more than any region heretofore visited and will remain a pleasant memory long after its vivid sunsets and fragrant woods are leagues behind. There is no use to try to see all of this beautiful section on one trip, but what you are able to discover as a touring visitor will linger as a sweet recollection for many

moons.

Burlington, the first important town west of the Kansas line, is an ardent supporter of the highway. The next stop of importance will doubtless be at Colorado Springs. Space does not permit the

portant city from the tourist's standpoint in Utah. It is a handsome city, with wide, tree-lined streets and a beautiful mountain background. Its chief interest for the general public arises from its association with the Mormons and



The Ruins of the Old "Chang" Station on the Original Overland Trail Pony Express in Nevada.

detailed description due this lovely garden of the Gods. The gorgeous growth of flowers and trees, the wierd rocks graven by nature into forms of men and beasts, all contribute to make this the most talked of and most popular of American pleasure resorts.

Leadville, at an elevation of 10,000 feet, is often times referred to as the City Above the Clouds. The mining camps are its chief attraction, but the miners of today are not Forty Niners, and are as peaceable as any community of law-abiding citizens elsewhere. They do not carry two pistols apiece and shoot at the stranger's heels as we were wont to believe they did.

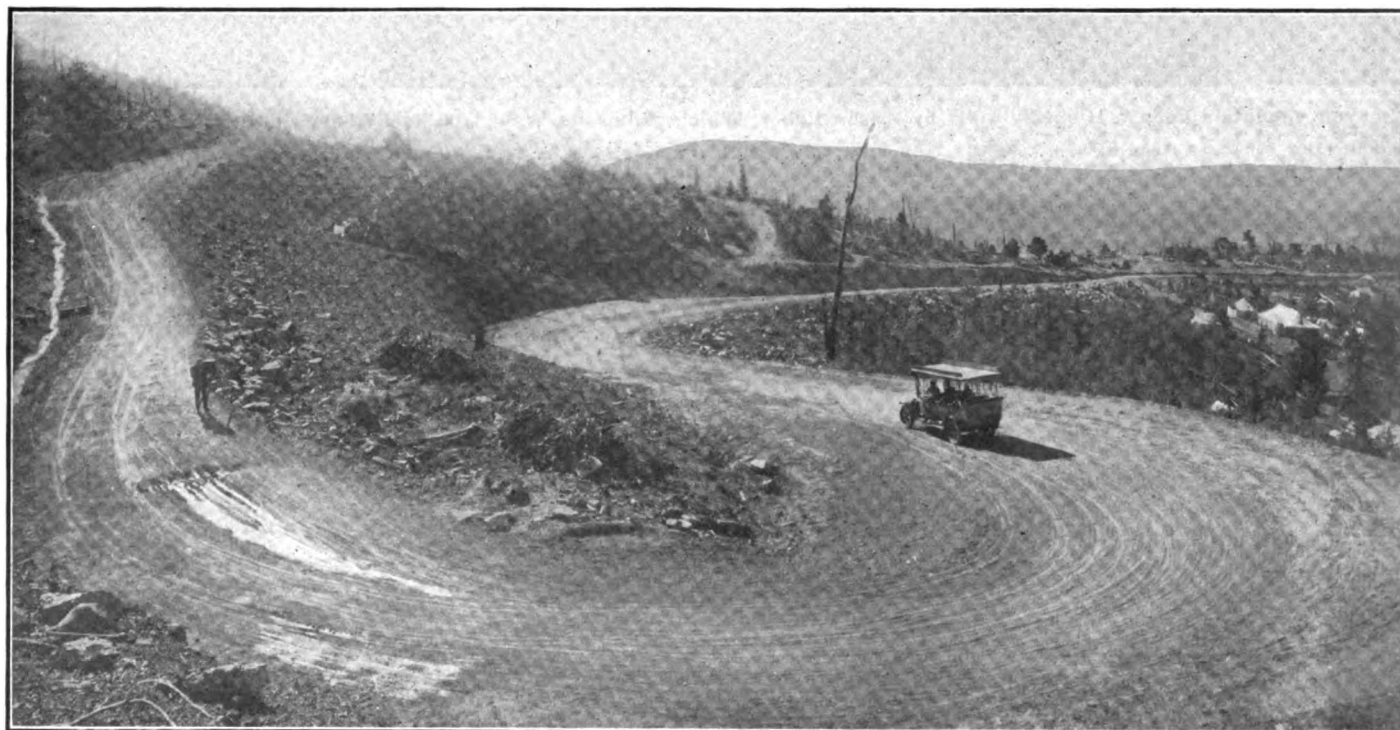
Glenwood Springs, the well known health resort, is situated in a beautiful flat, surrounded by forest clad hills. Millionaires make it a mecca in the summer time.

Of course Salt Lake City is the important city, it is still their capital and center of authority.

The most important Mormon buildings are in the heart of the city, but either the many pinnacled temple or the great, mushroom-shaped tabernacle have architectural charm.

Nevada is the irrigated section and is apt to seem prosaic with vivid Colorado fresh in memory. But Nevada blooms like the rose in comparison to what it was before it had water. Irrigation is a slow, tedious process at its best, and farming is no play under such conditions.

California is apt to impress you at first sight as the flattest thing you have ever seen. The world acknowledges the attraction of California by sending to its shores representatives of every land under the sun.



On the Automobile Highway to the Summit of Pike's Peak 14,109 Feet Above Sea Level.

ITINERARY. PIKE'S PEAK HIGHWAY.

Night Stops—New York, Reading, Penn.; Altoona, Pittsburg, Columbus, O.; Indianapolis, Ind.; Decatur, Ill.; Quincy, Brookfield, Mo.; Belleville, Kan.; Norton, Burlington, Col.; Colorado Springs, Leadville, Glenwood Springs, Rangely, Colton, Utah; Salt Lake City, Snowville, Wells, Nev.; Battle Mountain, Lovelock, Truckee, Cal.; Sacramento, San Francisco. Twenty-five Days, 3594.2 Miles.

New York-Reading.

Miles	Miles
New York 0.0	Easton 75.9
Newark 10.6	Bethlehem 87.4
Morristown.... 30.2	Allentown 93.1
German Valley 47.4	Kutztown 111.0

Indianapolis-Decatur.

Miles	Miles
Indianapolis... 0.0	Chrisman 85.3
Danville 19.7	Newman 103.5
Bainbridge ... 35.9	Tuscola 122.4
Rockville 59.1	Hammond 141.2
Montezuma.... 67.7	Decatur 164.8

Decatur-Quincy.

Miles	Miles
Decatur 0.0	Beardstown... 100.9
Buffalo 25.2	Rushville 114.0
Springfield ... 40.8	Mt. Sterling... 131.7
Berlin 55.9	Clayton 144.5
Jacksonville... 73.4	Camp Point.... 150.6
Concord 84.6	Quincy 174.7

Quincy-Brookfield.

Miles	Miles
Quincy 0.0	Clarence 79.1
Hannibal 18.7	Macon City.... 91.7
Monroe City... 45.7	Bucklin 120.1
Shelbina 66.0	Brookfield ... 131.3

Brookfield-St. Joseph.

Miles	Miles
Brookfield 0.0	Hamilton 57.3

Pulvero 48.1	Granite 111.1
Hartsel 63.5	Leadville 135.2

Leadville-Glenwood Springs.

Miles	Miles
Leadville 0.0	Wolcott 48.3
Pando 16.0	Gypsum 65.8
Redcliff 22.8	Glenwd. Springs 90.5

Glenwood Springs-Rangely.

Miles	Miles
Glenwd Springs 0.0	Meeker 75.9
Rifle 33.4	Rangely 136.9

Rangely-Colton.

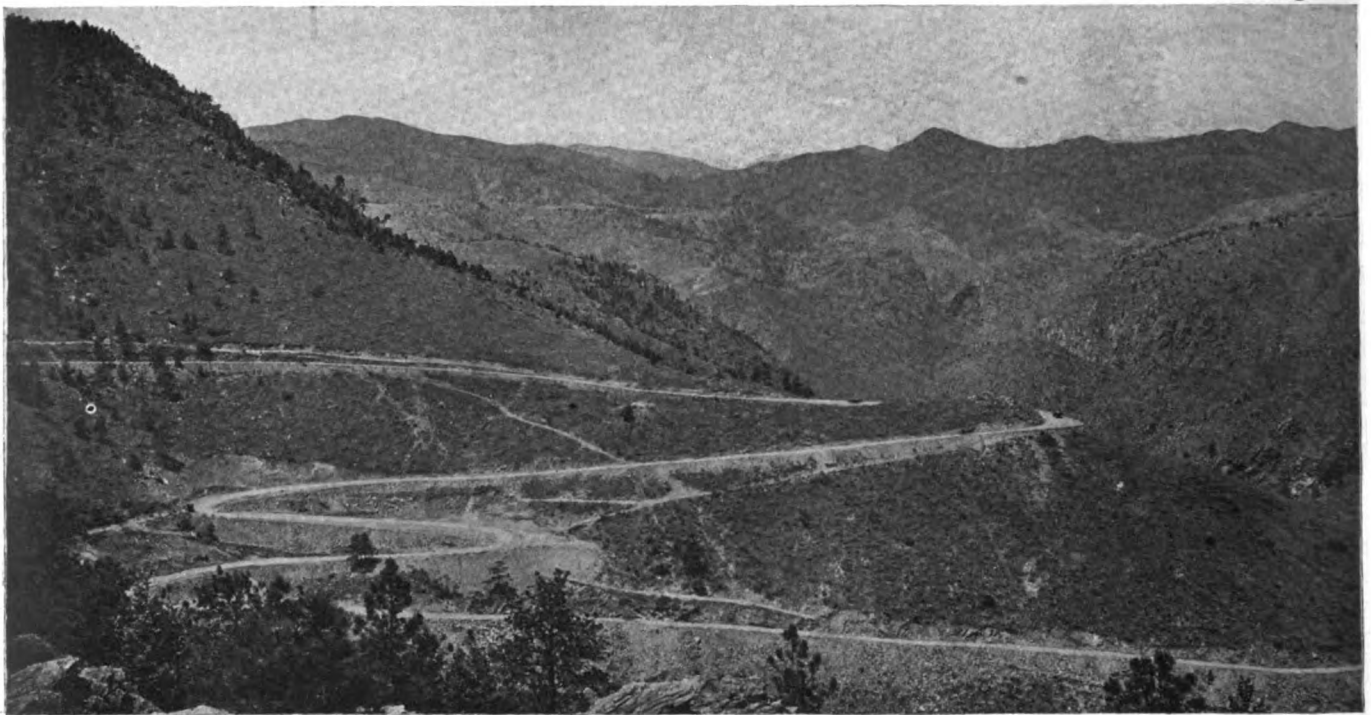
Miles	Miles
Rangely 0.0	Roosevelt 89.7
K Ranch 22.0	Duchesne 121.9
Vernal 57.3	Colton 172.5

Colton-Salt Lake City.

Miles	Miles
Colton 0.0	Provo 57.8
Thistle 33.7	Alpine 71.5
Spanish Forks. 47.0	Salt Lake City. 163.1

Salt Lake City—Snowville.

Miles	Miles
Salt Lake City 0.0	Honeyville 73.9



Lookout Mountain Loop, a Highway Built by Prison Labor, Which Winds Its Way 1700 Feet Above the City of Golden, Col.

Washington... 62.9	Reading 128.3
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Reading-Altoona.

Miles	Miles
Reading 0.0	Newport 79.9
Stouchsburg... 17.0	Mexico 97.4
Lebanon 27.8	Lewistown 112.9
Hummelstown. 43.9	Belleville 127.6
Harrisburg... 53.4	Alexandra 158.1
Clark's Ferry. 67.9	Altoona 190.1

Altoona-Pittsburg.

Miles	Miles
Altoona 0.0	N. Alexandria. 66.6
Holidaysburg. 7.0	Delmont 74.5
Summit 17.4	Wilkinsburg... 92.7
Clyde 47.5	Pittsburg 99.7

Pittsburg-Columbus.

Miles	Miles
Pittsburg 0.0	N. Comertown. 112.1
Florence 24.4	Franklin 130.6
Holiday Cove. 36.7	Dresden 141.7
Stenbenville... 44.7	Newark 165.1
Cadiz 65.8	Columbus 179.1
Urichville ... 87.0	Columbia C.... 183.1

Columbus-Indianapolis.

Miles	Miles
Columbus 0.0	Richmond 110.1
Brighton 30.2	Germantown... 124.3
Springfield ... 44.1	Ogden 142.0
Fairfield 57.0	Greenfield ... 158.2
Dayton 68.1	Cumberland... 168.6
Eaton 93.1	Indianapolis.. 179.0

Wheeling 18.4	Cameron 72.4
Chillicothe ... 29.0	St. Joseph 107.3

St. Joseph-Belleville.

Miles	Miles
St. Joseph..... 0.0	Seneca 85.8
Troy 14.8	Beattie 113.0
Highland 35.2	Marysville ... 121.1
Hiawatha 49.5	Washington ... 148.0
Sabetha 68.0	Belleville 185.5

Belleville-Norton.

Miles	Miles
Belleville 0.0	Kensington ... 79.3
Conrtland 16.7	Phillipsburg... 95.5
Mankato 34.0	Prairie View... 113.5
Smith Center.. 65.2	Norton 138.0

Norton-Burlington.

Miles	Miles
Norton 0.0	Colby 96.3
Dellvale 21.5	Brewster 115.0
Jennings 40.2	Goodland 133.3
Selden 63.2	Burlington ... 163.7

Burlington-Colorado Springs.

Miles	Miles
Burlington 0.0	Limon 83.9
Stratton 18.4	Mattison 105.5
Seibert 34.7	Calhan 127.8
Arriba 58.7	Falcon 149.1
Genoa 70.6	Colorado Spr's 168.8

Colorado Springs-Leadville.

Miles	Miles
Colorado Spr'gs 0.0	Bath 75.3
Edlewe 20.6	Buena Vista... 93.5

Ogden 37.9	Blind Springs. 89.8
Brigham City. 60.1	Snowville 117.3

Snowville-Wells.

Miles	Miles
Snowville 0.0	Montello 111.6
Lucin 94.2	Wells 166.3

Wells-Battle Mountain.

Miles	Miles
Wells 0.0	Carlin 79.6
Deeth 20.5	Richmond Mine 96.9
Elko 56.4	Battle Mtn.... 133.0

Battle Mountain-Lovelock.

Miles	Miles
Battle Mtn.... 0.0	Mill City 85.6
Golconda 40.0	Humboldt 99.2
Winnemucca... 57.0	Lovelock 132.4

Lovelock-Truckee.

Miles	Miles
Lovelock 0.0	Verdi 119.7
Wadsworth 75.8	Truckee 143.1
Reno 107.8	

Truckee-Sacramento.

Miles	Miles
Truckee 0.0	Auburn 76.5
Emigrant Gap. 32.6	Folsom 95.6
Colfax 58.5	Sacramento ... 117.4

Sacramento-San Francisco.

Miles	Miles
Sacramento.... 0.0	Livermore 95.1
Lodi 36.6	Oakland 130.7
Stockton 52.4	San Francisco. 136.3



The Guns of Victory Being Brought Into Position for Review by 5000 Artillerymen at Camp Hancock, Near Augusta, Ga.
(Copyright Committee on Public Information.)

THERE are 10 military cantonments located in the South in which more than half a million men are being trained. These camps need motor trucks and countless supplies from the northern factories. There are at least two ports in the South which could be used to great advantage in relieving the congested conditions of the ports of the northeast. The South's agricultural and mineral products, developed to their utmost capacity, are needed to help win the war. The rail congestion and accompanying embargoes are serious handicaps to southern business and war activities. Both freight and passenger rates have advanced. How much more serious the rail traffic conditions will become during the fall and winter of 1918 remains to be seen.

The two divisions of the Dixie Highway now serve directly or by short connections all of the army cantonments in the southeast. On the combined eastern and Carolina divisions, in addition to the aviation camps located near Detroit and Dayton, O., there are Fort Thomas, a training school for draft men located near Covington, Ky.; Camp Sevier at Greenville, S. C.; Camp Hancock at Augusta, Ga.; Camp Joseph E. Johnston at Jacksonville, Fla., and an aviation camp at Miami. Camp Wadsworth, Spartanburg, S. C.; Camp Greene, Charlotte, N. C., and Camp Jackson, Columbia, S. C.,

can be reached by short trips from the Dixie Highway. On the western division of the highway, in addition to Fort Benjamin Harrison at Indianapolis, Camp Taylor is encountered at Louisville, Ky.; Camps Greenleaf and Forrest at Fort Oglethorpe, near Chattanooga; Camp Gordon, Atlanta; Camp Wheeler, Macon, and aviation camps near Americus, Ga., and Arcadia, Fla. Camp Mc-



A Long Stretch of Perfect Highway in Tennessee.

Clellan, Anniston, Ala., can be reached by a short trip from Rome, Ga., on the highway between Chattanooga and Atlanta. Camp Sheridan, Montgomery, can be reached in six or seven hours by motor from Atlanta. The aviation camp at Pensacola, Fla., is accessible by a short trip from Tallahassee. The aviation

camp at Memphis is within a day's motor trip from Nashville. Camp Shelby at Hattiesburg, Miss., can be reached by continuing the trip from Atlanta through Montgomery, Ala. The routing of the Dixie Highway system now forms the solid foundation for a military series of roads between the North and the south-east.

Inaugurated for the promotion of a tourist route from northern Michigan to southern Florida, the Dixie Highway Association has during the past year felt the universal call to throw its heartiest efforts into the struggle for maintaining sanity in the world. And in the short course of one year the Dixie Highway has become a vitally necessary national highway. To open the entire route for the multitudinous commercial transportation needs; to provide as rapidly as possible for the increased overland delivery of cars and manufactured products; to hasten the day when the farmer will feel that he can raise every pound of grains and other foodstuffs of which his land is capable—because he can market it by highway at a reasonable cost; to connect the seaports with the vast interior wealth and resource of this nation; to provide highway routes of transportation from quartermaster depots to supply stations; to insure the safe truck traffic so necessary to the many military cantonments of the mid-

dle West and the South; these and countless other motives have been an urgent stimulus to the association to put on speed, more speed and yet more speed.

Much has been accomplished in the three years the association has been at work transferring from paper into a reality the Dixie Highway through the mountains of Kentucky and Tennessee. The more difficult work has been done. The remainder of the construction necessary to provide a surfaced road which can be used under all weather conditions from the vast producing and manufacturing centers of the North to the heart of the southeast, has been financed. Over \$1,000,000 of Federal and state aid, county funds and money raised by private subscription has been set aside by the state highway departments of Kentucky and Tennessee to complete these two divisions through the mountains this year. Two Federal aid projects have been approved. Five are awaiting the signature of the secretary of agriculture. Contracts have been awarded on two projects which are to be financed entirely by state aid and county funds.

New Route Adopted.

At a recent meeting of the board of directors of the Dixie Highway Association it was found necessary for the sake of speed to revoke a certain portion of the eastern division, between Corbin, Ky., and Knoxville, Tenn., and to substitute another route. The new routing of the highway, via Williamsburg, Kentucky, LaFollette and Clinton, Tenn., is supported by guarantees of a completed mileage within one year from date of the adoption of the routing. With the contemplated construction between Mt. Vernon and Corbin, Ky., the entire eastern division should be open to travel by fall of this year. There may be short stretches still to be surfaced, but the grading should all be completed and the greater part of the surfacing done.

The adoption of the Carolina division, extending from Knoxville, Tenn., through Asheville, Greenville, Augusta to Waynesboro, Ga., will stimulate road construction in the counties through



Skirting Mackinaw Straits, on Mackinac Island, Michigan.

which this route passes, and will open to the touring public unsurpassed scenery in the mountains of North Carolina.

Variety of Climate.

At present the trip from Chicago to Miami, Fla., can be made over good roads the entire distance, as routed in the accompanying itinerary, but when the entire system, as shown on the map, is completed it will form a highway which will be without a peer in the world for scenic beauty and variety of climate.

After passing around the State of Michigan, on the shores of Lakes Erie, Huron and Michigan, through forests of gigantic trees and into the centre of the automobile industry of the world, the highway strikes into that rich and fertile territory occupied by Ohio, Indiana and Kentucky. In Tennessee the environment becomes more mellow and the foliage along the roadside suggests the southern climate, while in the southern section of Georgia and in Florida the tourists see an indication of the tropics, the abundant efflorescence of the plants, shrubbery and trees making a sharp contrast to the type of country passed

through on the first part of the tour. From the cold, chilly winds of Mackinaw straits the tourist experiences every climatic condition prevailing in the United States until the arrival at Miami, where it is summer time the year around.

Florida Enchantments.

The method of travel through this great state today is in sharp contrast to that employed by Hernando de Soto when he made his memorable explorations through its vastness centuries ago, fighting Indians part of the time and suffering severe hardships all the time. A good, and in some places, excellent highway system takes the motor car tourist from the northern part of the state down either the east or west coast through a scenic splendor that would lead one to believe he were in Central America rather than in one of the United States.

Should the tourist cross the state from Miami to Marco he would follow the Tamiami trail. Here only recently geologists revealed the antiquity of Florida, unearthing the human remains that lived there from 10,000 to 20,000 years ago.



A Road Without a Peer, the Beautiful Palm Drive Terminus of the Dixie Highway Entering Miami, Fla.

ITINERARY. THE DIXIE HIGHWAY.

Night Stops—Chicago, Indianapolis, Louisville, Ky.; Nashville, Chattanooga, Atlanta, Macon, Jacksonville, Miami, Gainesville, Tallahassee, Macon, Knoxville, Cincinnati, Toledo, Detroit, Traras City, Mackinaw, Muskegon, South Bend.

Chicago-Danville, Ill.

Miles		Miles
Chicago	0.0	Watseka 84.2
Chicago H'ghts	28.8	Hoopeston 107.2
Momence	54.0	Danville 135.8

Danville, Ill.-Indianapolis, Ind.

Danville	0.0	Brownburg .. 74.6
Covington, Ind.	12.8	Indianapolis .. 88.9

Indianapolis-Dayton, O.

Indianapolis ..	0.0	Eaton, O. 84.6
Knightstown ..	34.3	Dayton 108.6
Richmond, Ind.	68.8	

Indianapolis-Louisville, Ky.

Indianapolis ..	0.0	Bedford 77.4
Martinsville ..	30.7	Paoli 101.0
Bloomington ..	52.8	Louisville 147.6

Louisville-Nashville, Tenn.

Louisville	0.0	Cave City..... 134.1
Elizabethtown ..	45.3	Russellville ... 194.0
Mumfordsville.	76.6	Nashville 249.3

Nashville-Chattanooga.

Nashville	0.0	Pelham 105.0
Laverne	15.7	Tracy City.... 118.4
Murfreesboro.	31.8	Sequatchie.... 135.3
Shelbyville	56.8	Jasper 139.2
Tullahoma	75.9	St. Elmo..... 162.3
Winchester	89.9	Chattanooga. 165.1

Chattanooga-Atlanta, Ga.

Chattanooga....	0.0	Marietta 120.7
Summerville....	45.1	Atlanta 139.0
Rome.....	70.5	

Atlanta-Milledgeville.

Atlanta	0.0	Madison 70.8
Decatur	6.6	Eatonton 94.7
Stone Mountain ..	16.6	Milledgeville .. 116.3

Atlanta-Macon, Ga.

Atlanta	0.0	Forsyth 69.3
Griffin	39.8	Macon 94.5

Macon-Jacksonville, Fla.

Macon	0.0	Waycross 174.8
Perry	28.2	Jacksonville .. 254.8
Fitzgerald	95.7	



Apex Mark of the Dixie Highway.
Stone at the Northern Terminus.

Jacksonville-Miami, Fla.

Jacksonville....	0.0	Melbourne 203.3
St. Augustine... 39.8		Fort Pierce... 252.1
Hastings..... 58.3		W. P'm Beach. 311.9
Daytona 113.2		F. Lauderdale. 354.0
Titusville 161.9		Miami 381.9

Miami-Jupiter, Fla.

Miami	0.0	W. P'm Beach. 69.1
F. Lauderdale.	26.1	Jupiter 85.9

Jupiter-Arcadia, Fla.

Jupiter	0.0	Arcadia 144.5
Okeechobee....	54.5	

Arcadia-Gainesville, Fla.

Arcadia	0.0	Leesburg 167.6
Bartow	52.5	Ocala 205.9
Orlando	116.0	Gainesville ... 249.8

Gainesville-Tallahassee.

Gainesville	0.0	Perry 118.4
Newberry	26.0	Simmons 139.4
Trenton	40.3	Lamont 150.9

Mayo 83.0 Tallahassee 181.4

Tallahassee-Jacksonville.

(Connecting Link.)

Miles		Miles
Tallahassee ...	0.0	Live Oak 83.4
Monticello	21.1	Lake City 108.6
Madison	54.2	Jacksonville .. 169.8

Tallahassee-Macon, Ga.

Tallahassee....	0.0	Americus 129.1
Thomasville... 34.3		Ft. Valley 174.7
Camilla	66.5	Macon 201.5
Albany	92.2	

Macon-Atlanta, Ga.

Macon	0.0	Griffin 54.7
Forsyth	25.2	Atlanta 94.5

Atlanta-Chattanooga, Tenn.

Atlanta	0.0	Dalton 90.3
Cartersville ... 41.3		Chattanooga ... 124.6

Chattanooga-Knoxville, Tenn.

Chattanooga....	0.0	Kingston..... 84.0
Dayton.....	38.9	Knoxville 131.5

Knoxville-Cincinnati, O.

Knoxville	0.0	Berea 129.6
Cilnton	15.2	Richmond 144.3
La Follette.... 35.4		Lexington 170.1
Williamsburg.	62.3	Georgetown... 179.0
Corbin	77.1	Williamstown 213.5
London	93.6	Covington 250.6
Mt. Vernon..... 109.6		Cincinnati .. 251.5

Cincinnati-Toledo, O.

Cincinnati....	0.0	Sidney 96.6
Middletown.... 33.0		Lima 132.0
Dayton	56.1	Findley 164.3
Troy	76.2	Bowling Green 187.2
Piqua	84.2	Toledo 210.0

Toledo-Detroit, Mich.

Toledo.....	0.0	Old Port 29.9
LaSalle	16.2	Wyandotte 46.7
Monroe	20.7	Detroit 58.4

Detroit-Mackinaw, Mich.

Detroit	0.0	Alpena 271.2
Flint	68.9	Onaway 340.0
Bay City..... 118.3		Mackinaw 382.7
Tarvas City....	196.8	

Mackinaw-South Bend, Ind.

Mackinaw.....	0.0	Grand Haven. 251.8
Petosky.....	38.3	Grand Rapids. 283.0
Traverse City.. 108.9		Kalamazoo 331.6
Manistee	141.4	South Bend.... 400.7
Muskegon	238.8	

South Bend-Indianapolis, Ind.

South Bend....	0.0	Logansport... 65.7
Plymouth	23.4	Indianapolis .. 135.9

(Cross route from Macon, Ga., to Jacksonville, Fla., via Savannah, Ga.)

Macon, Ga.-Jacksonville, Fla.

(Connecting Link.)

Macon.....	0.0	Savannah 207.5
Milledgeville.. 30.0		Riceboro 242.1
Waynesboro ... 112.7		Brunswick 283.4
Springfield ... 181.3		Jacksonville .. 373.7



On the Dixie Highway in Michigan, the Seven-Mile Road East of Woodward.

THE National Old Trails Road, an ocean to ocean highway, enjoys great popularity among tourists. The main route of this transcontinental highway has termini at Washington, Baltimore and Los Angeles. The section westward, as far as the Ohio river, is the oldest and most historic thoroughfare in the United States and should be of great delight to every American, as it passes through places identified by historic events in our country's history which should serve to stimulate a strong patriotic sentiment. A tour along this highway takes the motorist through the heart of the country, from ocean to ocean, if he makes the complete itinerary.

Starting from New York.

From New York to Philadelphia the Lincoln Highway is followed. The route runs through New Brunswick, Princeton, Trenton and Camden, over excellent highways. At Philadelphia the route turns southward, running along the Delaware river to Wilmington, thence through Elkton across the Susquehanna river to Bel Air, which is about 25 miles out of Baltimore.

From Baltimore to Washington, a distance of about 39 miles, the route is over the road once known as the "Washington Road," which was traveled by the stage coaches in the colonial days. Beyond Beltsville the Maryland agricultural station and the government aviation grounds are passed and a number of excellent examples of colonial architecture in old residences are seen. Bladensburg, the oldest settlement in Maryland, was the scene of the battle of Bladensburg, in 1814, when General Ross, commanding the English troops, defeated the American forces and gained entrance to the national capital.



The Mountain Village of Eckhart Tucked A

At the Nation's Capital.

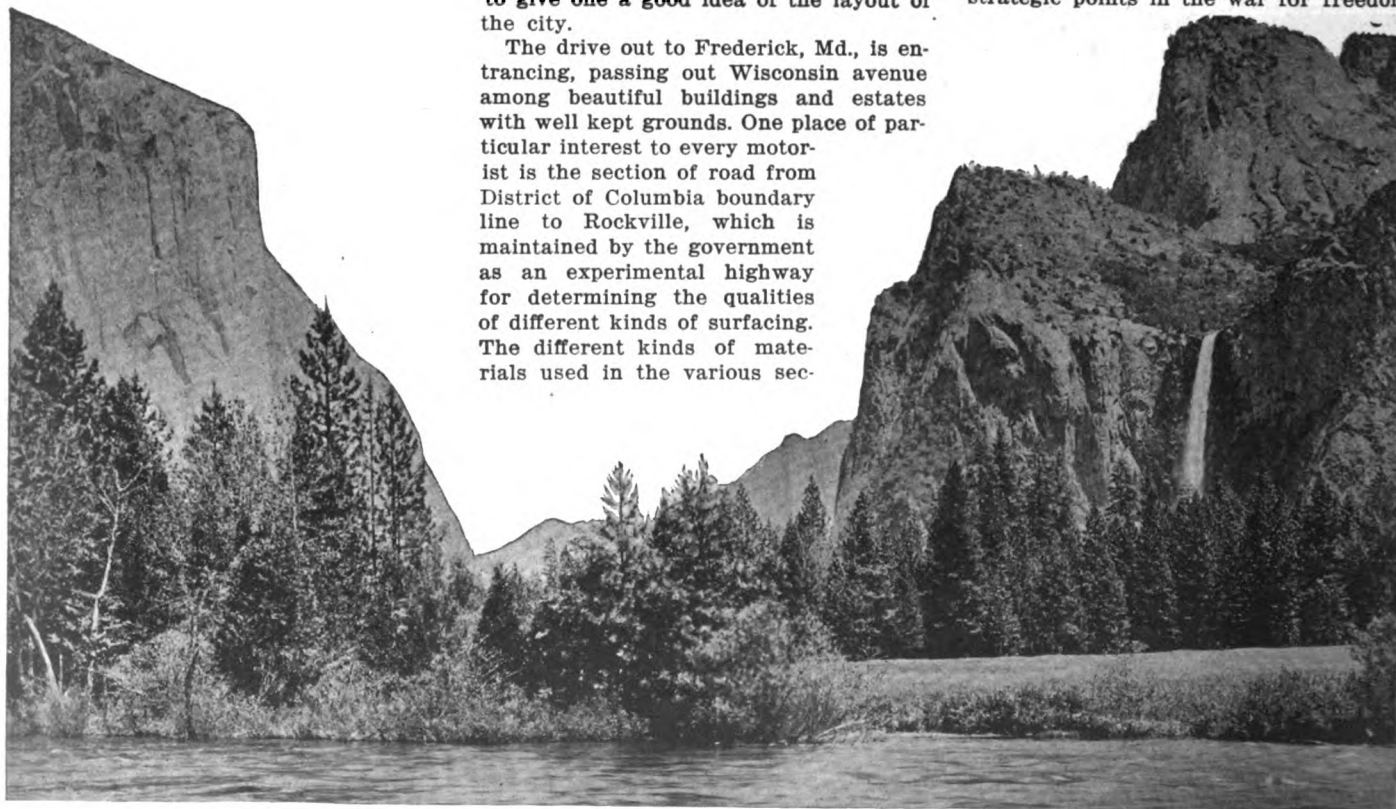
The tourist upon entering Washington will find so much of interest that he will be tempted to stay over the allotted time. A full week might be spent in inspecting the various government buildings and institutions. A ride around the principal avenues in the section of the Capitol and White House before leaving will suffice to give one a good idea of the layout of the city.

The drive out to Frederick, Md., is entrancing, passing out Wisconsin avenue among beautiful buildings and estates with well kept grounds. One place of particular interest to every motorist is the section of road from District of Columbia boundary line to Rockville, which is maintained by the government as an experimental highway for determining the qualities of different kinds of surfacing. The different kinds of materials used in the various sec-

tions are designated by signs placed along the roadway.

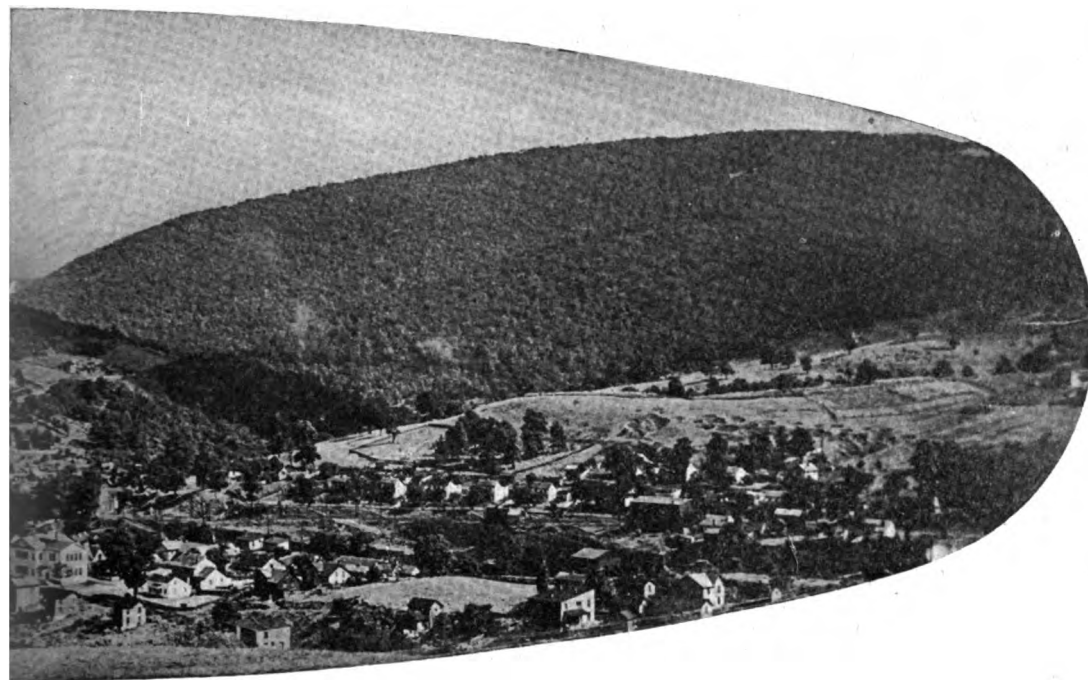
Between Urbana and the Monocacy river is the battlefield of the Monocacy, where General Lee Wallace and his command were defeated by the Confederate soldiers under General Jubal Early in 1864.

Frederick, Md., was one of the main strategic points in the war for freedom,



A Beautiful Vista in the Southwestern Mountains in America's Wonderland.

TRAILS ROAD



way in the Heart of the Appalachian Range.

and during the Civil War was occupied by the Confederate soldiers. Thomas Johnson, the first state governor of Maryland, who nominated George Washington as commander of the American armies, had his summer home on Rose Hill, which lies on the outskirts of the city. A stone freight house of the Baltimore & Ohio railroad, said to be the oldest in the world, is also located in Frederick. In crossing over Carroll's creek an inscription will be noticed on the bridge marking the spot where, legend says, Barbara Fritchie lived, the character that Whittier made famous in his poem of that name.

On the road from Frederick to Braddock Heights the mountains come into view for the first time and very soon the ascent of Catoclin mountain begins. In less than two miles the road rises about 450 feet between Braddock Village and Braddock Heights. From the latter elevation a beautiful view of all the surrounding country may be obtained, particularly South Mountain battlefields and the War Correspondents memorial arch.

Through Historic Places.

In Middletown, the next closely built up place, is the old home of Commodore Gelsinger, who fought naval battles with the pirates at Tripoli and Algiers. Beyond this point the road rises precipitately again. Beyond the stone Catholic church on South Mountain, which is reached through Turner's Gap, there are a number of memorial tablets, on which a description is given of the movements of the opposing armies across the mountain. It was here that Rutherford B. Hayes, who afterward became President of the United States, was wounded, and where William McKinley, who also became President, was first promoted.

Between South Mountain and Hagerstown, beyond Boonsboro, there is a short cut to Sharpsburg, from which place the Antietam battlefield may be reached. Hagerstown is the centre of a number of trunk highways extending North, South, East and West. Antietam is 11 miles south of the city and Gettysburg, 35 miles northward. The road going out toward Cumberland ascends a grade coming in view of Conococheague creek,

which winds around in the valley with short turns.

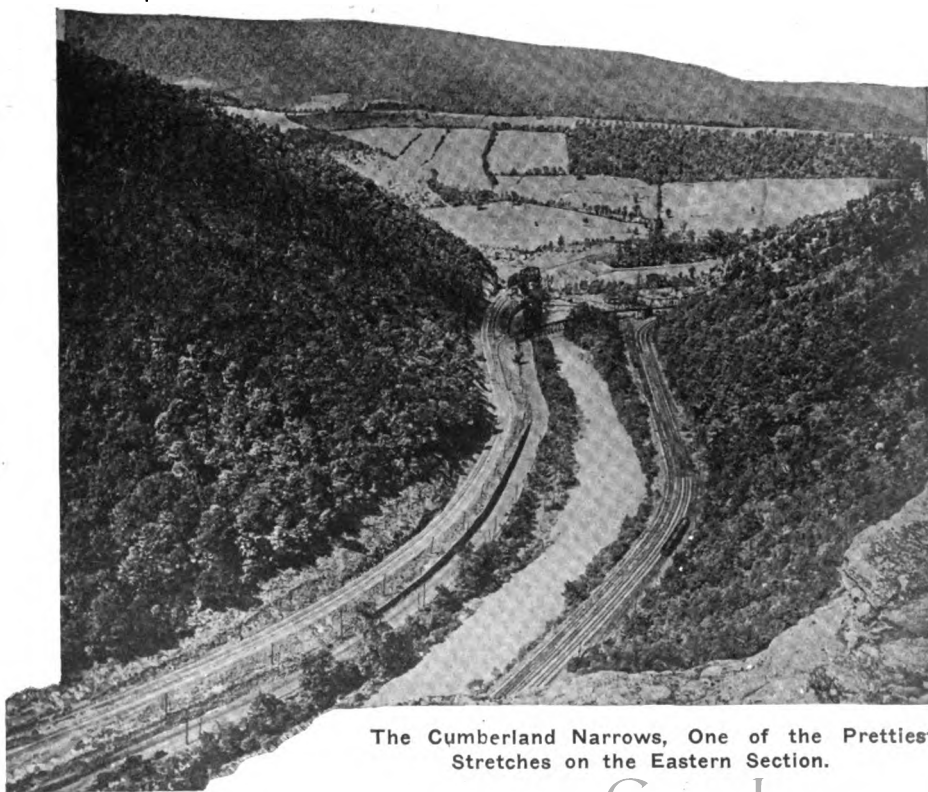
In Wild Sections.

From the top of Fairview Mountain into Baltimore and Indian Springs the road lies through a comparatively wild section. Beyond the latter place it runs along the Chesapeake & Ohio canal and Potomac river for a distance of 10 miles to Hancock, where it turns northward across the mountains. The country between these two points becomes a beautiful panorama of exquisite scenery.

The intervening distance, about 40 miles to Cumberland, is the most picturesque part of the entire trip. While the road winds around like a path in a maze and goes up and down the most precipitous grades of any well traveled thoroughfare in the country, it is easily followed. Out of Hancock the route leads up and over Tonoloway ridge, and further on over Sideling hill, where there is an ascent of 760 feet in a mile and a half.

Short Turns and Peaks.

The roads through this section are curved and contain many short turns, consequently, the motorist should drive very carefully, as while no danger exists to the machine that is under control, fast or reckless driving would be very foolish. Before the ascent of Town Hill, which is the next peak to be negotiated, some of the most beautiful scenic effects of the entire trip through the mountains become visible. The environment seems quiet and peaceful, as there is little evidence of habitation in view and one can see great distances into the mountains and across valleys and low plains. Coming down the west slope of Green Ridge, which is the next high elevation on the road, one of the largest cultivated apple orchards in the United States comes into view. There are nearly 50,000 trees in



The Cumberland Narrows, One of the Prettiest Stretches on the Eastern Section.

this orchard. Descending into the valley of Fifteen Mile creek, Polish mountain looms in the distance, across a great ravine, extending as far as the eye can see to the North and South.

Climbing Martin Mountain.

Passing on through Gilpin and into Flintstone, there is a hotel 108 years old, formerly known as the "Piper House," which looks little the worse for the wear of the elements. A few miles out of Flintstone the ascent of Martin mountain begins, during which a rise of 535 feet in a little over a mile is made to the summit, 1720 feet above sea level. Down the west slope the road leads through the valley into Cumberland on the Potomac river, the centre of transportation of that section. This city is about half way between Washington and Wheeling and is a convenient stopping place on the third night out, as it affords good hotel accommodations.

quaint town and it also contains many land marks nearly a century old. Twelve miles from Uniontown is Brownsville, on the Monongahela river, and 15 miles further on, Washington, which is the nearest point on the National road to Pittsburgh.

Now the Ohio Valley.

The route from Washington to Wheeling is mostly down hill and crosses the panhandle of West Virginia into the valley of the Ohio river. West of this point lays the great level farming lands and prairies that the pioneers of over 100 years ago sought after traveling over the National road to the Ohio river, and there is today an enormous amount of travel East and West through the city; more, probably, than through any other city of its size in the United States.

Here the Ohio river is crossed into Ohio. There is now an unbroken stretch of brick paving 16 feet wide through

The Marvelous Southwest.

The tourist first breaks into the real land of enchantment in leaving Raton, N. M., en route for Santa Fe. There is the wonderland of wonderlands with more marvelous scenic features than exist anywhere in the world. Even the atmosphere has its own peculiar charm, being rare and dry, although stimulating in its effect upon the senses. The horizon and zenith seem to be nearer the earth and objects take on a more definite outline and appear more vivid and fresh, while colors teem with the hues of the spectrum wherever the sun's rays strike.

It is a land of enchantment and the original inhabitants appear as weird to the newcomer in that territory as the animals in the zoo to a child upon its first visit. Here are also found ruins of habitations that were occupied by the oldest race of Americans of which there is any



Civilization's Most Modern Type of Transportation in the Land of the Ancient Aztecs, Where the Pueblo Indians Live in Community Dwellings.

From Cumberland to Wheeling the distance is about the same as that traveled on the previous day and the route leads through the section which became prominent historically during the French and Indian war. This section was entirely constructed at the expense of the government. As far as Uniontown, which is half way to Wheeling, the road continues through the mountainous country, attaining much higher altitudes, however, the elevation at the summit of Big Savage mountain being 2880 feet and at Meadow mountain 2792 feet. A few miles out of Farmington, close by the road, is the site of "Fort Necessity," where during the French and Indian war George Washington was forced to surrender his command.

The remainder of the road into Uniontown is through a heavily wooded section. There are many old taverns in this

Zanesville to Columbus.

From Columbus to the Indiana state line, on the old National road, there is much brick paving, and from there on to St. Louis rough dirt roads, about the worst of the trip, are encountered.

At Booneville, Mo., the third of the old trails, the Santa Fe, begins and continues through Kansas City, across Kansas and a corner of Colorado, through New Mexico to Santa Fe.

Westward, Ever Westward.

Over excellent roads, through the wonderful Kansas wheat fields, the route goes west across the state. The Colorado line is crossed between Coolidge, Kan., and Holly, Col. The route crosses the Arkansas river at La Junta and shortly crosses the New Mexico line to Raton, to which it goes down through the Raton pass.

trace left. They lived in a period antedating most accounts in history and it was undoubtedly a prehistoric time.

As It Was Centuries Ago.

This is Pueblo country and the Pueblo Indians, unlike their brethren of the red skin, abjured all the advances of the white man to change their modes, dress, speech, customs and religions. They still adhere to the same type of abode and manner of eating and dressing as was handed down to them by their forefathers who met the Spanish and French explorers that came into their country over 300 years ago. The nondescript is present on every hand and the further into this maze of marvels the traveler goes the more the unexpected becomes the expected.

Santa Fe and the country immediately about the city, is worthy of a stopover



A Scene of Indescribable Grandeur in the Grand Canyon of Arizona—Main Chasm is 217 Miles Long and 9000 Feet Deep.

of several days and for an even longer period if one delights in delving into ancient lore. La Ciudad Real dela Santa Fe de San Francisco, as Santa Fe was called when it was founded by the Spaniards in 1605, 150 years before the United States became a nation, was a settlement, dating back into antiquity. For this reason it is now the leading centre of archaeological research in the United States and a school and museum of the American Institute is maintained there. It is in an old palace which has housed 76 rulers of Mexican and Spanish blood and 19 American territorial governors.

Grand Canyon of Arizona.

Passing into Arizona the first of the great sights of the Southwest that is encountered is a section of the Petrified Forest. This is looked upon as one of the chief marvels of the world. It is spread over several large tracts, the first of which is encountered six miles out of Adamana. Three miles further on is the second forest and the third and largest is 13 miles southwest of Adamana. There are two others, the Blue Forest and the North Sigillaria. The first named is seven miles southeast of Adamana and the latter nine miles north of that place.

Leaving Flagstaff the tourist takes the highway northward, a distance of 79 miles to Grand View Point, which is lo-

cated on the rim of the Canyon, where one of the most wonderful views of the region is to be had. From this point the highway runs through a winding course for 14 miles along the rim of the Canyon to Eltovar Hotel, where another wonderful view is visible. From the latter point the highway turns southward again and joins the main transcontinental highway at Williams.

The greatest minds of the world, upon first viewing this wonderful country, were at loss for words in which to describe their impressions. The mountains and huge embattlements, seem to speak from a long gone past.

Across the Mojave desert, once a great graveyard for travelers and their animals, a fine modern road, costing \$10,000 to \$15,000 a mile has been built. It is kept oiled most of the way and alkali dust is scarce on the run of 165 miles, which can be made at better than 20 miles an hour by almost any car. There are stations, too, where car supplies and food may be purchased. From Barstow, on the western side of the desert, it is a run of 78 miles to San Bernardino. El Camino Real, from San Diego to the north, connected the old Spanish missions, rare specimens of a distinctive architecture, with each other. Los Angeles is 68 miles from San Bernadino.

ITINERARY.

NATIONAL OLD TRAILS ROAD.

Night Stops—New York City, Philadelphia, Washington, D. C.; Cumberland, Md.; Wheeling, W. Va.; Columbus, O.; Indianapolis, Terre Haute, Ind.; St. Louis, Columbus, Mo.; Kansas City, Emporia, Hutchinson, Dodge City, Syracuse, Kan.; La Junta, Trinidad, Col.; Las Vegas, Santa Fe, Albuquerque, McCarty's, Gallup, N. M.; Holbrook, Flagstaff, Kingman, Ariz.; Amboy, San Bernadino, Los Angeles, Santa Barbara, Pasa Robles, Santa Cruz, San Francisco, Cal. Thirty-one Days, 3726 Miles.

New York-Philadelphia.

Miles		Miles	
New York.....	0.0	Monmouth Jct.	46.3
Jersey City.....	6.3	Trenton	63.4
Newark	12.2	Oxford Valley.	70.0
Elizabeth	18.0	Hulmeville	73.6
Rahway	23.1	Andalusia	78.9
Iselin	27.4	Torresdale	81.1
Metuchen	31.4	Holmesburg	83.4
New Brunswick	36.0	Philadelphia ..	95.6

Philadelphia-Washington.

Miles		Miles	
Philadelphia ..	6.0	Perryville	66.9
Darby	6.3	Webster	68.0
Glendolen	8.2	Churchville ...	70.5
Norwood	9.3	Belair	76.3
Eddystone	12.5	Kingsville	83.5

Chester	13.6	Carney	89.7
Marcus Hook ..	18.5	Baltimore	100.4
Claymount	20.1	Elkridge	109.4
Holly Oak	21.2	Laurel	121.4
Wilmington	26.4	Contee	123.4
Elsemere Jct. ...	29.3	Beltville	126.9
Marshalltown ..	32.0	Hyattsville	133.4
Newark	40.0	Bladensburg	133.9
Elkton, Md.	46.6	Washington	139.4

Washington-Cumberland.

	Miles		Miles
Washington ..	0.0	Benevola	62.7
Bethesda	7.4	Hagerstown	70.7
Rockville	15.3	Hancock	97.7
Gaithersburg	20.5	Bellegrove	110.7
Clarksburg	28.5	Pinney Grove	114.7
Hyattstown	32.4	Pratt	122.7
Frederick	43.7	Glilpen	125.7
Middletown	51.7	Filmtstone	126.7
Boonsboro	59.7	Cumberland	139.7

Cumberland-Wheeling.

	Miles		Miles
Cumberland ..	0.0	Summit	56.0
Frostburg ..	11.0	Uniontown ..	62.0
Grantville ...	25.0	Brownsville ..	74.0
Keyser Ridge ..	31.0	Scenery Hill...	86.0
Addison	36.0	Washington ...	99.0
Somerfield ...	40.0	Claysville ...	109.0
Farmington ...	50.0	Wheeling	132.0

Wheeling-Columbus.

Miles		Miles	
Wheeling	0.0	Norwich	60.5

Terre Haute-St. Louis.

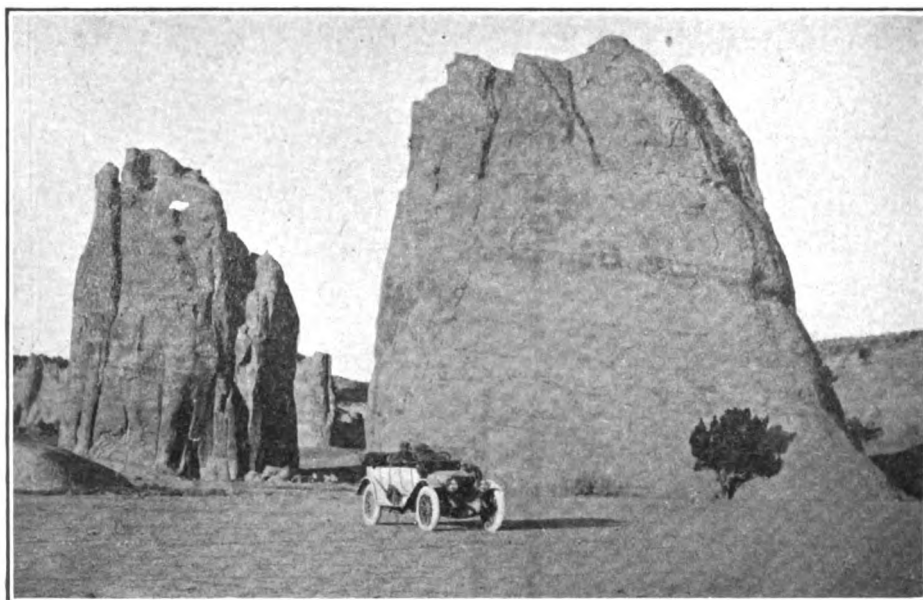
	Miles		Miles
Terre Haute...	0.0	Vandalia	100.2
Marshall, Ill. ...	16.8	Hagerstown	104.5
Martinsville	27.6	Mulberry	111.3
Capey	33.9	Greenville	120.0
Greenup	43.7	Pocahontas	130.0
Teutopolis	62.1	Highland	139.0
Emingham	66.0	Collinsville	160.0
Altamont	80.4	St. Louis, Mo.	172.0

St. Louis-Columbia.

	Miles		Miles
St. Louis.....	0.0	Warrenton	65.9
Weilston	6.4	Jonesburg	75.7
Pattonville	14.4	Danville	88.7
St. Charles	19.8	Mincola	91.4
Colterville	30.8	Calwood	109.1
Wentzville	45.1	Fulton	117.0
Fortistell	52.1	Millersburg	128.1
Wright	56.6	Columbia	140.7

Columbia-Kansas City.

	Miles		Miles
Columbia	0.0	Dover	103.5
Rockport	14.4	Lexington	114.5
New Franklin	30.1	Wellington	121.8
Booneville	33.1	Levasy	132.3
Arrow Rock	53.6	Independence	150.2
Marshall	70.5	Centropolis	154.4
Waverly	92.3	Kansas City	159.2



The Haystacks, an Erosion Effect in the Great Natural Wastes on the Southwest-ern End of the National Old Trails.

Bridgeport	1.2	Zanesville	72.4
St. Clairsville ..	10.9	Sterling	80.5
Lloydsville	16.1	Brownsville	86.3
Morristown	19.9	Linnville	91.0
Hendricksburg ..	25.6	Jackson	95.0
Fairview	29.0	Hebron	99.0
Washington	40.6	Kirksville	105.0
Cambridge	49.0	Etna	111.6
New Concord	57.3	Columbus	128.1

Columbus-Indianapolis.

	Miles		Miles
Columbus	0.0	Dayton	67.9
Alton	9.4	New Lebanon	78.3
W. Jefferson	14.4	Johnsville	80.2
Lafayette	21.8	W. Alexandria	86.2
Summerford	26.5	Eaton, O.	91.7
Brighton	30.3	Richmond, Ind. ...	107.6
Vienna	32.9	Centerville	113.7
Harmony	37.5	Cambridge City ..	123.0
Springfield	43.4	Lewisville	132.8
Enon	51.2	Knightstown	142.2
Fairfield	57.4	Greenfield	155.2
Harshman	63.7	Indianapolis	176.4

Indianapolis-Terre Haute.

	Miles		Miles
Indianapolis ...	0.0	Coatsville	40.0
Bridgeport	9.0	Reelsville	45.9
Plainfield	13.8	Harmony	51.8
Belleville	18.7	Brasil	54.9
Stilesville	26.9	Seeleyville	62.5
Mt. Meridan	32.9	Terre Haute	70.4

Kansas City-Emporia.

	Miles		Miles
Kansas City...	0.0	Ottawa	71.2
Martin City...	16.4	Williamsburg..	88.4
Olathe	28.8	Waverly	101.5
Edgerton	46.7	Emporia	134.1

Emporia-Hutchinson.

Miles		Miles	
Emporia	0.0	Florence	48.8
Cottonwood ...	21.8	Peabody	63.7
Elmdale	28.0	Halstead	85.2
Clements	35.7	Hutchinson	122.3

Hutchinson-Dodge City.

	Miles		Miles
Hutchinson . . .	0.0	Great Bend . . .	68.0
Sterling	24.9	Kinsley	115.7
Lyons	34.4	Spearville . . .	137.7
Chase	44.1	Dodge City . . .	154.8
Ellinwood	57.6		

Dodge City-Syracuse.

Miles		Miles	
Dodge City....	0.0	Lakin	78.1
Colmarron	19.2	Kendall	95.0
Ingalls	26.2	Syracuse	107.4
Garden City....	53.0		

Syracuse-La Junta.

Miles		Miles	
Syracuse	0.0	Powers	65.4

Holly	22.0	Las Animas	93.7
Granada	39.7	La Junta	115.5
Lamar	57.3		

La Junta-Trinidad.

Miles		Miles	
La Junta.....	0.0	Kadrew	76.2
Timpas	23.3	El Mora.....	87.6
Thatcher	54.8	Trinidad	91.3

Trinidad-Las Vegas.

	Miles		Miles
Trinidad	0.0	Springer	69.7
Raton, N. M.	25.4	Wagon Mound	97.6
Maxwell	54.1	Watrous	120.5
French	58.9	Las Vegas	141.0

Las Vegas-Santa Fe.

Miles		Miles	
Las Vegas.....	0.0	Pecos	49.5
Tecolote	12.0	Glorieta	55.6
Bernal	18.2	Canoncito	60.0
Pajarita	40.5	Santa Fe.....	75.3
Rowe	42.8		

Sante Fe-Albuquerque.

Miles		Miles	
Sante Fe.....	0.0	Sandia	52.5
Domingo	26.9	Alameda	58.7
Algodones	41.2	Albuquerque...	66.7

Albuquerque-McCarty's.

Miles	Miles
Albuquerque... 0.0	Casa Blanca....55.1
Atrisco 3.3	McCarty's 82.3
Laguna 48.3	

McCarty's-Gallup.

	Miles		Miles
McCarty's	0.0	Thoreau	43.0
Grant's	13.0	Gonzales	50.0
Toltec	17.0	Guam	54.0
Bluewater	25.0	Perea	58.0
Baca	33.0	Wingate	64.0
Chaves	40.0	Gallup	76.0

Gallup-Holbrook.

Miles		Miles	
Gallup	0.0	Pinto	88.0
St. Michael's, Ariz.	26.0	Petrified For- est	102.0
Wide Ruins	56.0	Carrizito	111.0
Navajo	81.0	Holbrook	124.0

Holbrook-Flagstaff.

Miles		Miles	
Holbrook	0.0	Tolchaco	75.4
Winslow	36.0	Flagstaff	117.0
Leupp	64.6		

Flagstaff-Kingman.

	Miles		Miles
Flagstaff	0.0	Pica	101.0
Riorden	7.0	Yampai	106.0
Bellemont	12.0	Field's Station	108.0
Maine	20.0	Peach Springs	120.0
Chalender	24.0	Cherokee	126.0
Williams	36.0	Truxton	132.0
McClellan	44.0	Valentine	139.0
Ash Fork	56.0	Hackberry	144.0
Pineveta S'tion	64.0	Antares	151.0
Crookton	69.0	Hualpai	158.0
Seligman	81.0	Louise	172.0
Chino	85.0	Kingman	174.0

Kingman-Amboy.

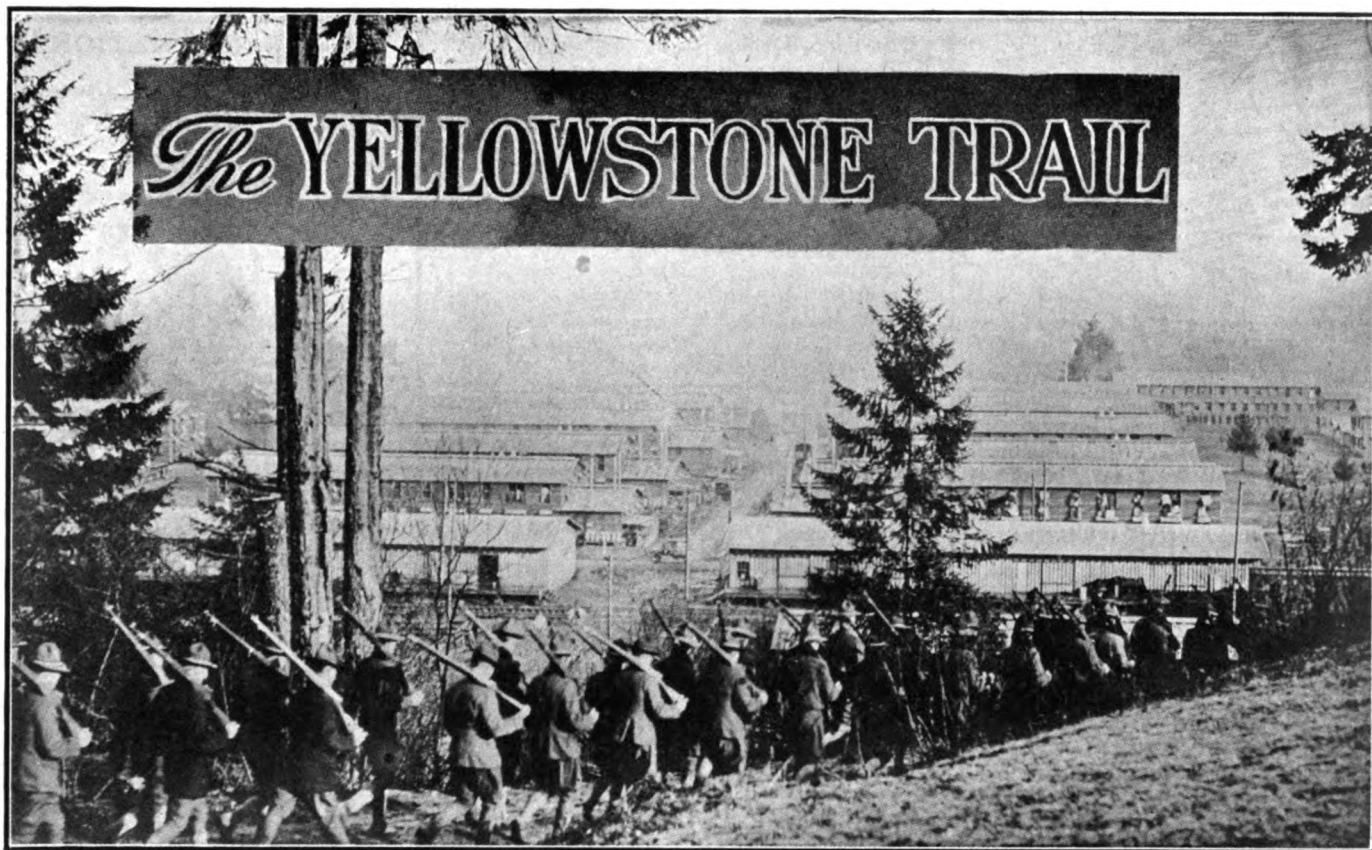
	Miles		Miles
Kingman	0.0	Homer	94.0
McConico	4.0	Goff's	102.0
Yucca	25.0	Fenner	111.0
Topock	55.0	Danby	127.0
Needles	71.0	Cadiz	140.0
Kilnefelter	83.0	Amboy	154.0

Amboy-San Bernadino.

	Miles		Miles
Amboy	0.0	Todd	88.0
Bagdad	7.0	Hicks	94.0
Ash Hill	21.0	Hellen	103.0
Ludlow	28.0	Oro Grade	113.0
Lavie	37.0	Victorville	119.0
Plagah	42.0	Hesperia	127.0
Hector	47.0	Cajon	140.0
Newberry	61.0	Cozy Dell Store	142.0
Mincola	67.0	Devore Store	149.0
Daggett	73.0	Vermont	151.0
Baratov	82.0	San Bernadino	160.0

San Bernadino-Los Angeles.

	Miles		Miles
San Bernadino.	0.0	Pomona	46.8
Riverside	10.9	Lemon	54.8
Bloomington	18.7	San Marino	72.7
Etiwanda	30.9	Le Senda.....	74.7
N. Cuckamonga 34.9		Pasadena	79.1
Upland	38.5	Los Angeles	80.0



Men of Our National Army Back from a Long Hike Through the Hilly Regions at Camp Lewis, Near Tacoma, Wash.
(Copyright by Committee on Public Information.)

A TOUR over the Yellowstone Trail affords the motorist an exceptionally instructive trip as he passes from Plymouth, Mass., where the Mayflower landed with its sturdy band of settlers, across the country through the densely populated sections into the vast wheat fields of Minnesota and the Dakotas into the western mining country and territory where many of the scenic wonders of the world are found in several of our great national parks. These great reservations which have been set aside by the government to preserve their natural wonders and also as a place of refuge for animal life, include the Yellowstone, Glacier and Mt. Rainier national parks, the first named being the largest in the country.

The general impression among motorists who have never visited these great recreation grounds is that they are vast stretches of wilderness where touring or camping trips are only made by encountering great hardships and inconveniences. Last year nearly 500,000 tourists visited the national parks during the summer season, and it is anticipated that this year a much larger number will avail themselves of the excellent weather and stimulating environment that is found at this time of the year in these mountainous regions where the Department of the Interior has spent enormous amounts of money to turn them into ideal vacation grounds.

As will be seen from the master map, the local maps and itinerary, the Yellowstone Trail is one of the most convenient for New Englanders and residents of

New York state and the lake states to use in reaching the national parks in the northwest. Starting from Plymouth, Mass., on the shores of Cape Cod bay, the route passes through Providence, R. I.; Hartford, Conn., and through the cities of Poughkeepsie, Binghamton, El-

mira and Olean in New York state in the order named. Crossing the northwestern corner of Pennsylvania, through the cities of Warren and Mercer, the trail leads into Youngstown, O.; Akron, O., and thence into Ft. Wayne, Ind. From the latter place it turns northward around the southern shores of Lake Michigan to Chicago, Ill. Continuing northward along the lake shore, through Kenosha and Racine, Wis., the route turns westward at Milwaukee. Oshkosh, Stevens Point and Eau Claire are passed through on the way to the Twin Cities, St. Paul and Minneapolis.

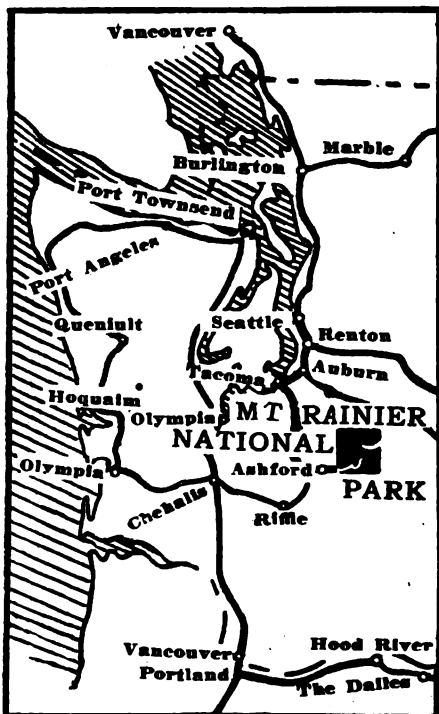
Crossing the Mississippi the route strikes out directly westward through the great wheat fields of western Minnesota, South Dakota, the southwest corner of North Dakota into Montana, where it joins at Terry the famous Yellowstone Trail from which it derived its name. This trail follows the winding course of the Yellowstone river through Billings, Livingston, Butte and Missoula, all in Montana.

Detour to National Park.

At Livingston, which is the nearest point along the trail to the Yellowstone National Park, a highway runs southward to Gardiner, the entrance to the park. After arriving at the park one is immediately impressed with the exceptionally fine accommodations afforded, as the Interior Department has made great effort to put the parks on a par with the best equipped summer resorts in the world. The excellent hotel system at the Yellowstone Park has recently been supplemented by a system of



Bears Exploring a Tree in a National Park Forest.



Showing Road Connections Leading to Mt. Rainier National Park.

excellent new permanent camps, and in place of the historic stage coaches that were formerly used in carrying sight-seers in this wonderland, the government has substituted 10-passenger cars.

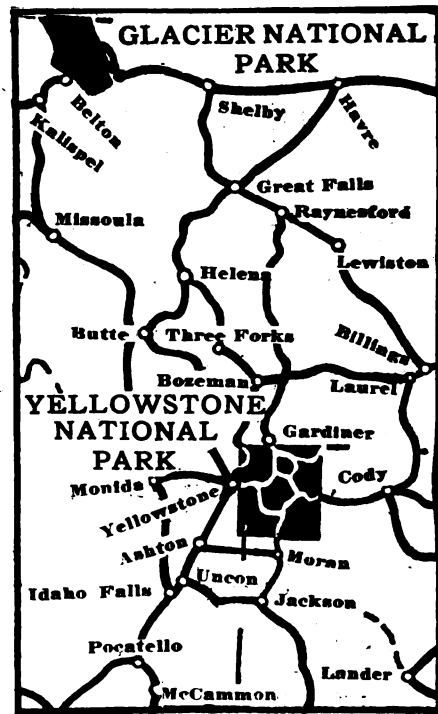
A whole book, devoted exclusively to a description of the Yellowstone Park would be entirely inadequate to more than touch upon the wonders it contains. In brief, the park is distinguished for its unexcelled scenic wonders and evidences of natural phenomena, including the many large geysers which are greater in size and number than are to be found elsewhere in the entire world. There are also many hot springs within its boundaries that enclose 3300 square miles, or more land than many of the small principalities abroad. The most famous of all these geysers is Old Faithful, which spouts every 70 minutes.

Further along the Yellowstone Trail at Missoula, a route leads northward into Glacier National Park, which received its name because it forms a vast basin holding 60 odd glaciers amid a boundary of mountains. It covers an area of 1534 square miles, within which there is said to be more beautiful mountain scenery than can be found even in the European Alps. Precipices 3000 or 4000 feet deep form the background in many places for beautiful lakes formed from the water of the melting glaciers. There are 250 known lakes and probably many more in this park, as many sections still remain unexplored. The license fee for using motor vehicles in this park is \$1 and is also payable in cash at point of entry. It has not the big system of roadways excellent for automobile travel such as is found in Yellowstone Park.

Starting back on the Yellowstone Trail at Missoula, the route crosses the Continental Divide, passing through Wallace and Couer D'Alene in Idaho, to Spokane. From this point the trail swings southward around the southwestern boundary line of the State of Washington, through Walla Walla and across the Columbia river to Prosser, thence turning northward through North Yakima, Cle Elum, Seattle and terminating at Tacoma, where there is a connecting road 56 miles long leading back to the Cascade mountains and into Mt. Rainier National Park.

From the entrance at Nisqually river there is a road about 20 miles long leading into Paradise valley. There is another road leading into the park at the northeast corner at White river. The road is about 12 miles long and terminates at Glacier Basin, but there are no connections for motor travel with the route into Paradise Valley.

Mt. Rainier National Park, which has an area of 207,360 acres, received its name from Mt. Rainier, the second loftiest mountain in the United States, which rises in the centre of the great glacier basin in the middle of the park. This peak rises 14,408 feet and nearly 10,000 feet of this rise is direct from its



Road Connections to Yellowstone and Glacier National Parks.

immediate base. Twenty-eight glaciers surround the mountain, which is thought to have been 16,000 feet in height before a volcanic eruption tore off 2000 feet.

ITINERARY. YELLOWSTONE TRAIL. Plymouth-Providence.

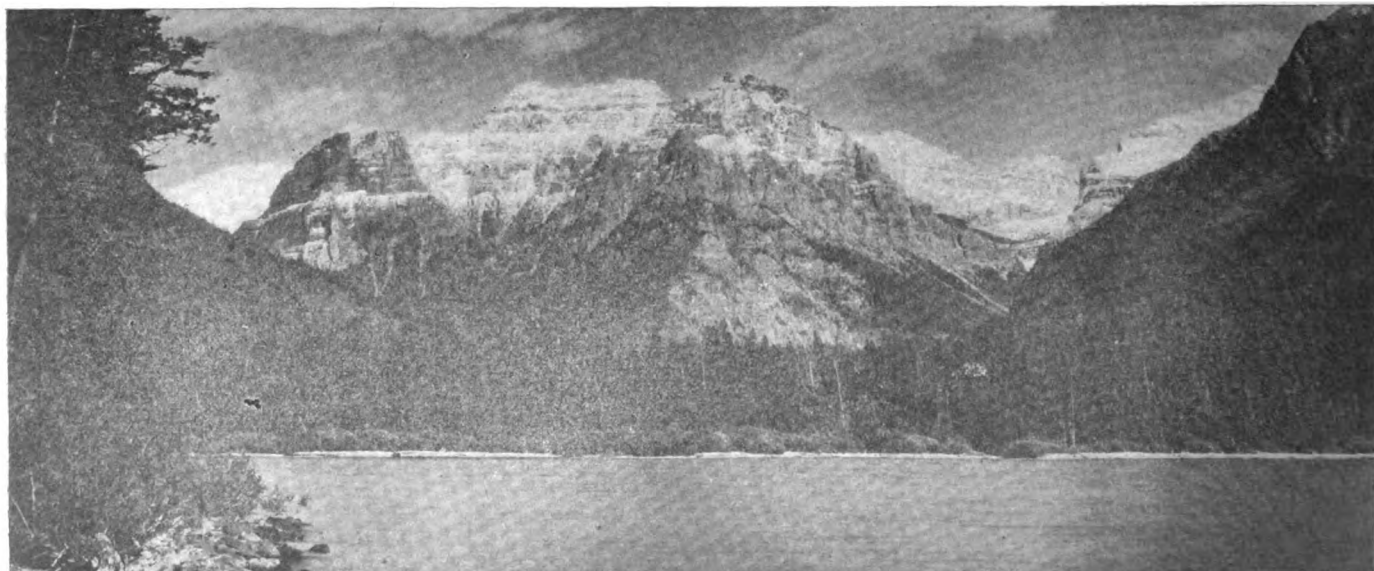
Miles	Miles
Plymouth 0.0	E. Providence. 42.8
Middleboro ... 14.7	Providence 43.3
Taunton 25.8	

Providence-Hartford.

Miles	Miles
Providence.... 0.0	Willimantic.... 56.9
Chepatchet.... 15.4	Andover 65.3
Pomfret 32.1	Hartford 84.0

Hartford-Danbury.

Miles	Miles
Hartford 0.0	N. Milford..... 38.9
Plainville ... 13.8	Brookfield ... 61.7
Danham 34.2	Danbury 69.6



The Vastness of This Great Park Inspires One with Awe and Wonder.

Danbury-Poughkeepsie, N. Y.

Miles	Miles
Danbury 0.0	Stormville 27.8
Mill Plain 3.9	Fishkill P. 34.1
Brewster, N. Y. 10.0	N. Hackensack 37.7
Carmel 14.5	Poughkeepsie.. 45.1

Poughkeepsie-Kingston, N. Y.

Miles	Miles
Poughkeepsie.. 0.0	Rhinecliff 18.5
Hyde Park 6.1	Rondout F. 18.6
Rhinebeck 16.2	Kingston 22.0

Kingston-Binghamton.

Miles	Miles
Kingston 0.0	Afton 126.3
Arkville 57.8	Ninevah 131.6
Delgi 83.3	Belden 136.9
Unadilla 109.9	Sanitary Sp. 142.6
Bainbridge 120.4	Binghamton .. 153.7

Binghamton-Elmira.

Miles	Miles
Binghamton... 0.0	Waverly 45.0
Owego 24.3	Lowman 55.6
Smithboro 35.2	Elmira 63.6

Elmira-Salamanca.

Miles	Miles
Elmira 0.0	Almond 67.1
Corning 18.6	Alfred Sta. 70.8
Addison 30.2	Andover 79.8
Cameron 43.2	Bollivar 101.9
Canisteo 56.5	Salamanca 138.2
Hornell 61.8	

Salamanca, N. Y.-Youngstown, O.

Miles	Miles
Salamanca 0.0	Mercer 168.0
Warren 65.0	Youngstown .. 210.0
Franklin 128.0	

Youngstown-Akron, O.

Miles	Miles
Youngstown... 0.0	Ravenna 32.6
Edinburg 25.9	Akron 50.0

Akron-Ft. Wayne, Ind.

Miles	Miles
Akron 0.0	Ottawa 147.8
Oberlin 46.7	Du Pont 162.8
Bellevue 83.0	Paulding 178.0
Fostoria 118.8	Ft. Wayne 218.0

Ft. Wayne-Chicago.

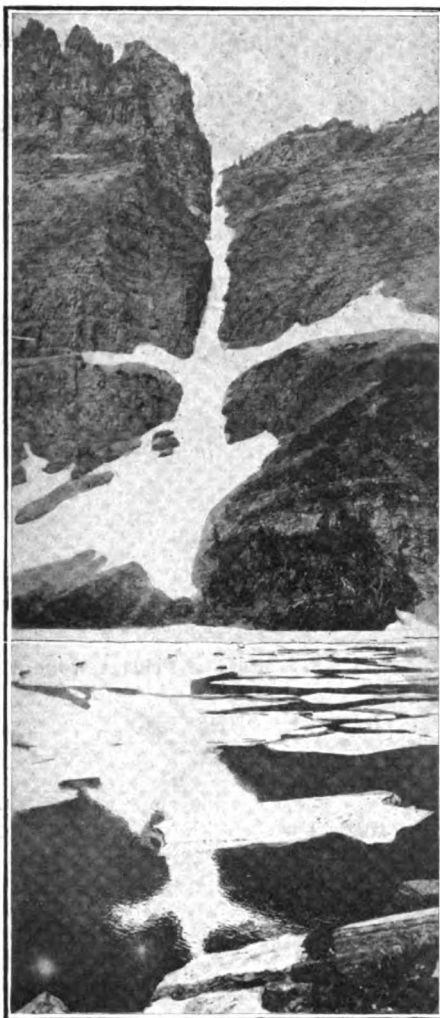
Miles	Miles
Ft. Wayne.... 0.0	Valparaiso 119.2
Columbia City. 20.5	East Chicago.. 146.2
Warsaw 42.9	Hammond 149.2
Plymouth 72.5	Chicago 170.2

Chicago-Milwaukee.

Miles	Miles
Chicago 0.0	Kenosha 62.3
Evanston 13.1	Racine 73.0
Highland Pk. 26.0	S. Milwaukee.. 87.0
Waukegan 46.5	Milwaukee 96.4

Milwaukee-Minneapolis.

Miles	Miles
Milwaukee 0.0	Stanley 229.0
Fond Du Lac.. 62.0	Eau Claire.... 259.5



Iceberg Lake, Glacier National Park, Montana.

Oshkosh 81.0	St. Paul 358.7
Stevens Pt. ... 140.3	Minneapolis .. 368.7

Minneapolis-Milbank.

Miles	Miles
Excelsior 17.1	Sacred Heart.. 122.9
Waconia 31.1	Granite Falls.. 131.9
Brownton 67.9	Ortonville 205.4
Hector 86.9	Milbank 219.9

Milbank-Selby.

Miles	Miles
Milbank 0.0	Ipswich 127.0
Webster 45.0	Howdie 157.0
Aberdeen 97.0	Selby 180.0

Selby-Hettinger.

Miles	Miles
Selby 0.0	McIntosh 110.5
Mobridge 35.0	Hettinger 197.5

Hettinger-Terry.

Miles	Miles
Hettinger 0.0	Baker 158.5
Bowman 72.0	Terry 260.5
Martin 115.5	

Terry-Custer.

Miles	Miles
Terry 0.0	Forsyth 90.9
Miles City 39.3	Custer 142.6

Custer-Livingston.

Miles	Miles
Custer 0.0	Reed Point.... 124.7
Billings 57.7	Livingston 185.5

Livingston-Butte.

Miles	Miles
Livingston 0.0	Whitehall 105.1
Bozeman 26.7	Butte 139.2
Three Forks.. 61.5	

Butte-Drummond.

Miles	Miles
Butte 0.0	Garrison 63.8
Anaconda 25.8	Drummond 86.6
Deer Lodge.... 52.3	

Drummond-Wallace.

Miles	Miles
Drummond 0.0	Missoula 58.1
Bearmount 13.5	Wallace 181.5

Wallace-Spokane.

Miles	Miles
Wallace 0.0	Coeur D'Alene. 52.3
Kellogg 11.6	Spokane 86.0

Spokane-Walla Walla.

Miles	Miles
Spokane 0.0	Dayton 143.5
Colfax 80.2	Walla Walla... 176.4
Pomeroy 115.0	

Walla Walla-North Yakima.

Miles	Miles
Walla Walla.. 0.0	Prosser 78.0
Sudbury 7.0	Grandview 91.0
Divide 26.0	Zillah 111.0
Walla Walla.. 29.0	Donald 120.0
Kennewick 45.0	Yakima 127.0
Kiona 63.0	North Yakima.. 132.0

North Yakima-Cle Elum.

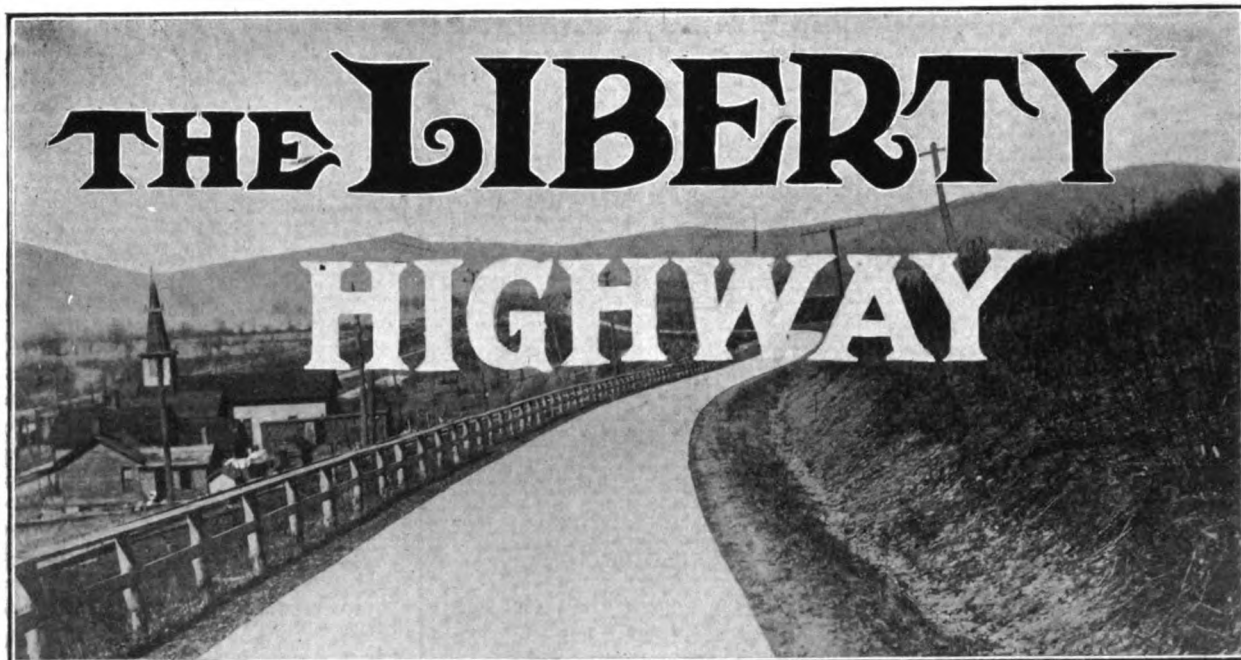
Miles	Miles
North Yakima. 0.0	Thorp 53.0
Pomona 9.0	Tennaway 65.0
Wenas 27.0	South Cle Elum 69.0
Ellensburg 41.0	Cle Elum 72.0

Cle Elum-Tacoma.

Miles	Miles
Cle Elum 0.0	Isaquah 90.0
Nelson 16.0	South Park... 109.0
Laconia 43.0	Seattle 114.0
Edgewick 61.0	Christopher ... 146.0
Fall City..... 79.0	Tacoma 154.0



Mt. Rainier, Which Forms the Center of Twenty-Eight Great Glaciers—Altitude 14,408 Feet.



Between Salamanca and Olean in New York State a Perfect Road Winds Over Hill and Dale.

By R. H. JOHNSTON.

AS A result of recent exploring trips I am able to announce that there is available a fine touring and "drive-away" route between Cleveland and New York, which has been almost unknown and unused to the present. It has long been the belief of the great majority of motorists that there are but two practicable routes between Cleveland and New York, namely, the Mohawk Valley route by way of Buffalo, Syracuse and Albany, and the Lincoln Highway route by way of Pittsburgh and Philadelphia. I am among those who shared this belief, and, accordingly, when I started a few weeks ago to explore the roads to determine the advisability of driving new cars and trucks from Cleveland to New York, I first tried out the Mohawk Valley route and then the Lincoln Highway route. As I found that both of these routes, in their present condition, were open to very grave objections, I determined that an entirely new route must be found.

Over Fine State Roads.

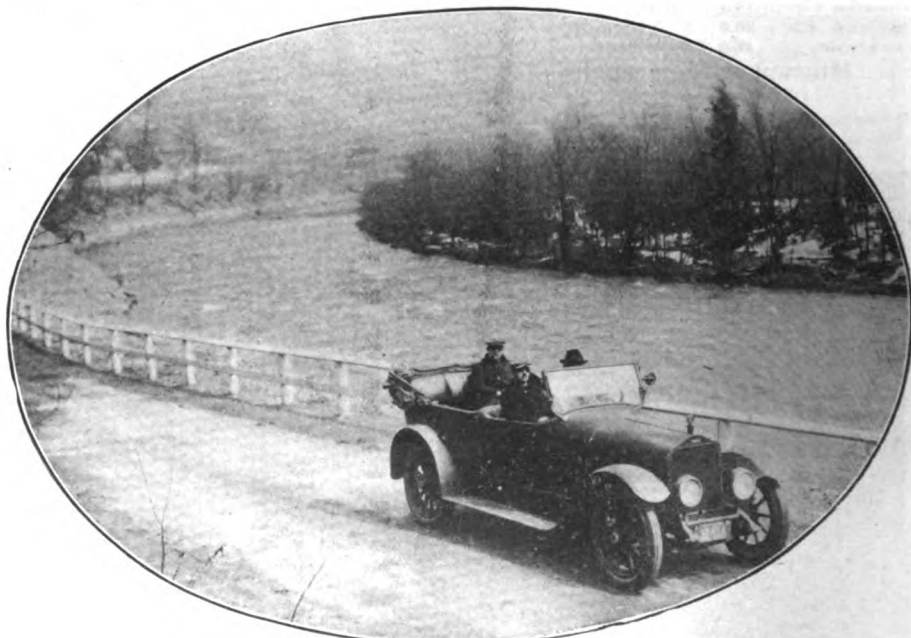
After piecing together all the bits of information that were available and after studying the maps, I decided to drive westward from New York by way of Liberty, Binghamton, Elmira, Hornell, Olean, Jamestown and Westfield. I found this route to be in good condition all the way and from every point of view much preferable to either the Mohawk Valley route or the Lincoln Highway route. The greater part of the new route between Fort Lee ferry and Westfield is over fine state roads, many of which are so new and have been subjected to so little traffic that they are absolutely flawless. There are less than 25 miles of road between Fort Lee and Westfield which are not of modern construction, and by "modern" I mean dustless, bumpless and rutless. Most of these 25 miles of unimproved road lie between Salamanca and Randolph. This

stretch might be classed as "good country road." There are also short stretches of bad roads here and there in the outskirts of a few of the towns in the gaps between the state road and the paved streets.

Splendid Scenery.

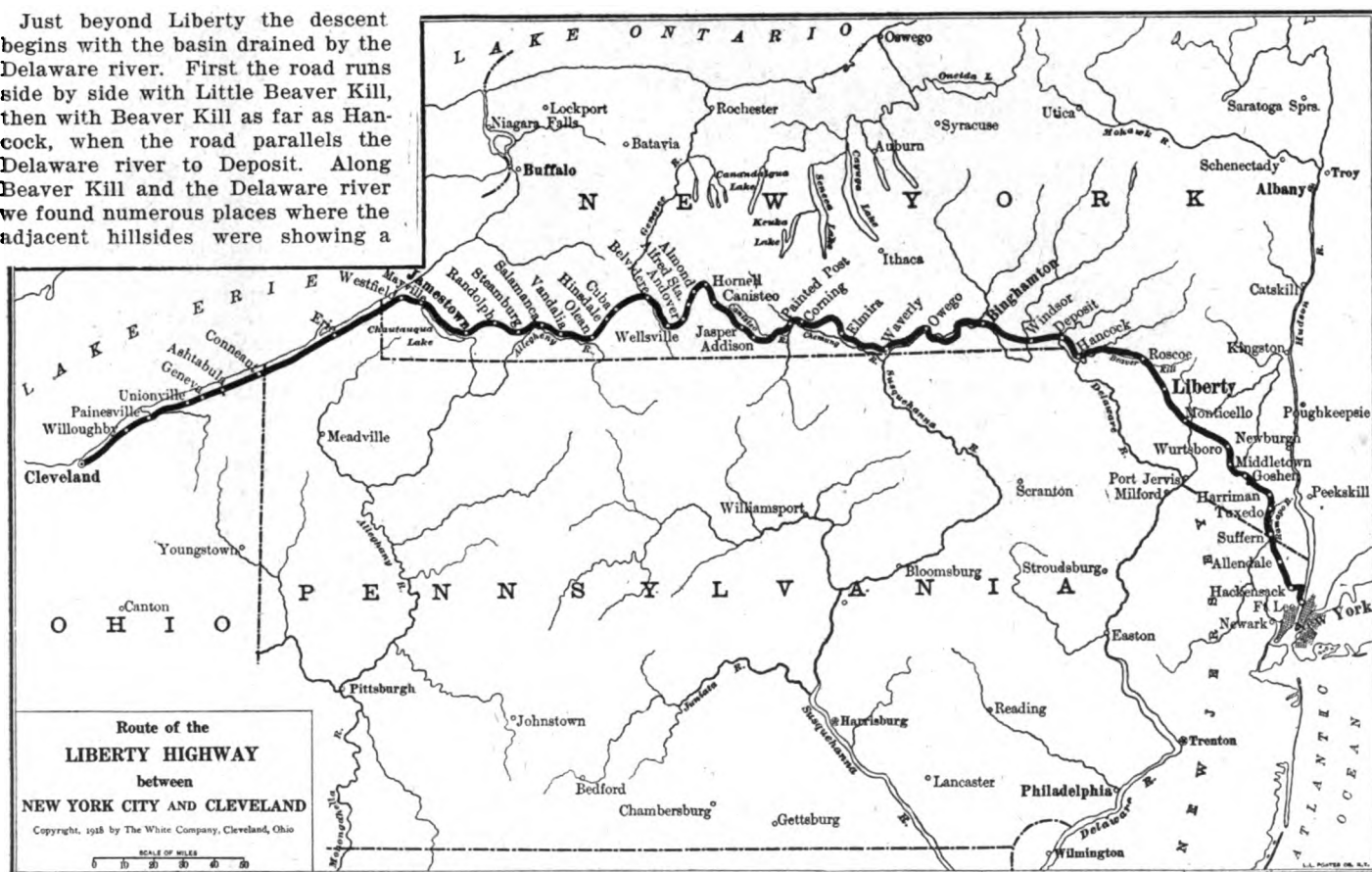
The new route from New York to Cleveland is about 585 miles long. This is about 80 miles less than the Mohawk Valley route and is only about 30 miles longer than the Lincoln Highway route. Owing partly to the spirit of the times and partly to the fact that the tourist setting out from New York over the new route makes his way toward Liberty, it seems to me that the new route should be known as the "Liberty Highway," and I will so designate it.

A distinguishing characteristic of the Liberty Highway, aside from the fine average conditions of the road service, is the splendid scenery which it unfolds to the tourists, as may readily be imagined from a study of the topography of the route. Most of the time the route follows the several valleys which distinguish the southern tier counties. The road winds picturesquely through these valleys, following the meanderings of the water courses. At Suffern, N. Y., just over the New Jersey line, the Liberty Highway meets the Ramapo river and runs with it past Tuxedo Park to Harri-man. Here the road strikes off sharply to the west and mounts ever higher and higher, by easy grades, through Goshen, Middletown and Wurtsboro to Liberty.



A Beautiful Highway Winds Along the Picturesque Beaver Kill River for Many Miles Near Horton.

Just beyond Liberty the descent begins with the basin drained by the Delaware river. First the road runs side by side with Little Beaver Kill, then with Beaver Kill as far as Hancock, when the road parallels the Delaware river to Deposit. Along Beaver Kill and the Delaware river we found numerous places where the adjacent hillsides were showing a



tendency to slide down over the road. Strong concrete retaining walls have been built along this road for miles at a stretch, but when a hillside starts to move the retaining walls can do but little to hold it back. Fortunately, there are road gangs constantly patrolling the roads and as soon as one of these miniature landslides occurs the road is quickly cleared.

From Deposit the road mounts over the hills and after crossing the Susquehanna river at Windsor meets this lazy

stream again at Binghamton and follows it almost to Waverly. Beyond Waverly the road courses along the banks of the Chemung river past Elmira and Corning through Addison. Here the road again strikes over the mountains and descends to the valley of the Canisteo river, a few miles from Hornell. From that city the road goes "cross country" to Wells-ville, where it meets the gentle Genesee. The river is left sharply behind at Belvidere, from which the road leads through a wondrously beautiful valley

through Cuba and Hinsdale to Olean.

Skirts Lake for 20 Miles.

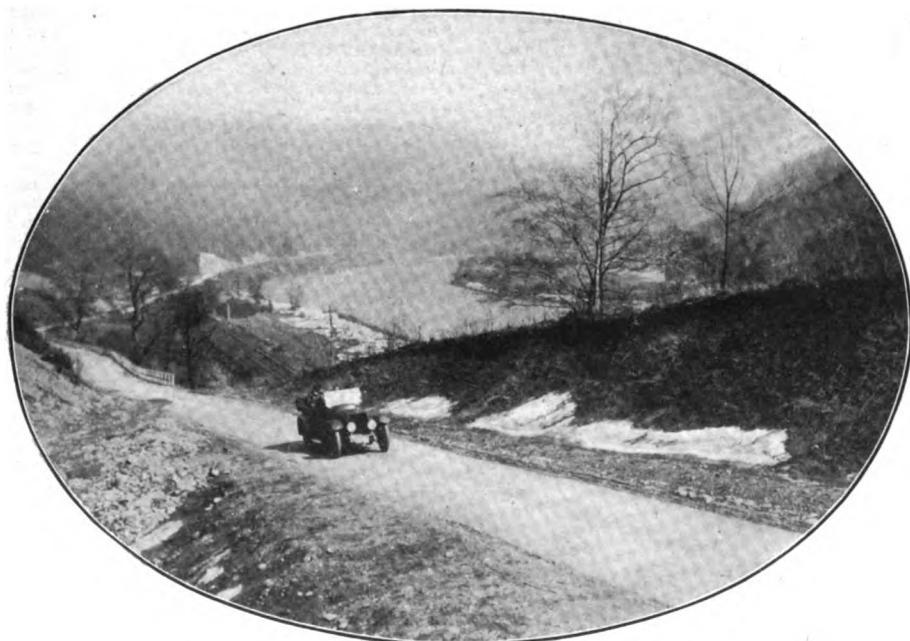
Then comes that perfect, almost unused road following the course of the Allegheny river through Vandalla to Salamanca. This river is followed still further to Red House, whence the road again carries the tourist over the hills, so that the next body of water that he sees is beautiful Lake Chautauqua at Jamestown. Skirting this lake for 20 miles the road leaves it at Mayville and drops several hundreds of feet in the next six miles to Westfield, on the shores of Lake Erie.

At Westfield the scenic part of the Liberty Highway is at an end. Here, too, is almost the end of the modern improved roads. New York state thought it wise to build a fine highway from its southeast corner to Westfield, but in the pre war era of self-satisfied state complacency it did not think it worth while to build to the Pennsylvania state line.

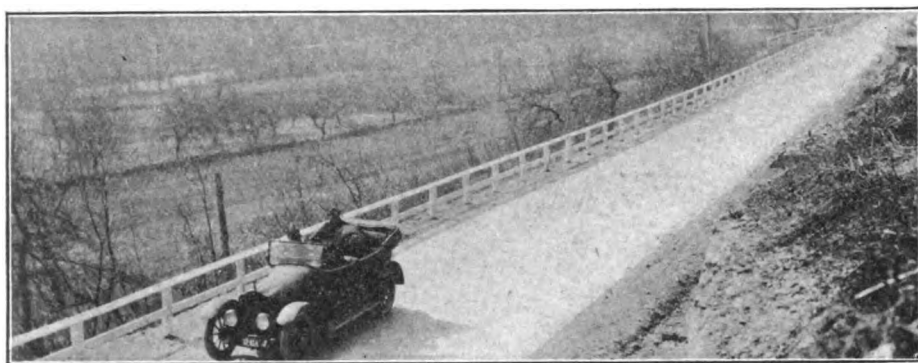
Only One Poor Section.

Similarly, Pennsylvania did not think it worth while to connect up the New York state line with the Ohio state line. Ohio in turn did not go further east than Ashtabula with its good road system. Thus it happens that between Westfield and Ashtabula the road has not been systematically improved. The war time urgency has resulted in some belated attempts to put this road in condition, but this part of the road is still the poorest link of the great Liberty Highway. From Ashtabula to Cleveland the roads are splendid.

An idea of the generally fine condition of the Liberty Highway may be obtained from the schedule which I fol-



On the Road to Binghamton the Highway Lies Over Hills and Through Valleys Along the Susquehanna River.



Steep Grade Near Monticello, N. Y., on an Unsurpassed Highway.

lowed in my recent exploring trip. We made Elmira from New York the first day, Erie on the second and drove from Erie to Cleveland on the morning of the third day. Even if there were no other reasons the over-crowded condition of the hotels, garages, and even the roads of the Mohawk Valley and the other highway routes make it advisable that a third highway should share the ever increasing "drive-away" traffic.

Fortunately, the Liberty Highway is well provided with both hotels and garages and as for the roads they are practically bare of traffic.

ITINERARY.

NEW YORK-CLEVELAND.

New York to Goshen.

Miles	Miles
New York.... 0.0	Tuxedo..... 31.8
Ft. Lee, N. J.. 2.0	Southfield.... 35.7
Hackensack... 6.8	Chester..... 49.0
Suffern..... 25.3	Goshen..... 53.4

Goshen to Binghamton, N. Y.

Miles	Miles
Goshen..... 0.0	Liberty..... 45.2
Middletown.. 8.4	Roscoe..... 61.6
Wurtsboro... 20.6	Cooks Falls... 67.8
Monticello... 32.0	Hancock..... 90.8
Ferndale..... 42.9	Binghamton.. 133.3

Binghamton to Elmira, N. Y.

Miles	Miles
Binghamton.. 0.0	Waverly..... 45.0
Owego..... 24.3	Elmira..... 63.6

Elmira to Jamestown, N. Y.

Miles	Miles
Elmira..... 0.0	Hornell..... 61.8
Corning..... 18.6	Almond..... 67.1
Painted Post.. 21.2	Andover..... 79.8
Addison..... 30.2	Wellsville... 88.1
Cameron..... 43.2	Olean..... 119.6
Canisteo..... 56.5	Jamestown... 173.3

Jamestown, N. Y., to Erie, Pa.

Miles	Miles
Jamestown... 0.0	Westfield.... 27.5
Greenhurst... 5.0	Northeast, Pa. 42.9
Mayville..... 21.0	Erie..... 54.2

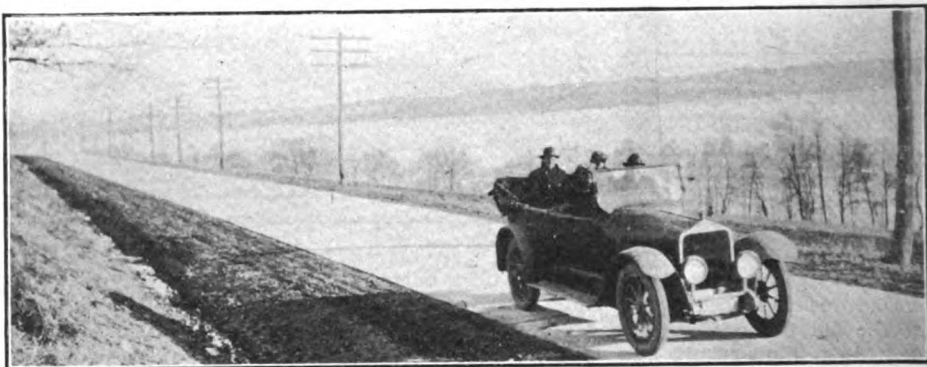
Erie, Pa., to Cleveland, O.

Miles	Miles
Erie..... 0.0	Unionville... 58.4
Conneaut.... 30.2	Madison..... 61.3
Kingsville... 38.2	Palmsville... 72.8
Ashtabula, O.. 44.7	Willoughby... 83.0
Geneva..... 54.5	Cleveland.... 102.0

taken over to Jersey City and a run made down to South Amboy through Newark, Elizabeth and Perth Amboy; or South Amboy may be reached by ferrying over to Staten Island and ferrying again to the mainland.

Upon arriving at Atlantic City the tourist upon his first visit to this mecca of vacationists and pleasure seekers, will be astounded at the many thousands of people who gather there at this season of the year to disport themselves in the ocean and in the casinos and pleasure places. This city, which has only a few thousand native residents, has a floating population during the summer months of 250,000 to 300,000 people. The route is indicated on the New England and Atlantic coast tours map.

Lakewood, situated among the Jersey Pines, is not only a popular summer and winter resort, but is famous for its many palatial residences, including that of George Gould at Georgiana court, where the famous Lakewood golf links are laid out.



Along the Beautiful Lake Chautauqua There is a Stretch of Perfect Road.

Jersey's Famous Summering Places

ARRIVING in New York from New England, the West or South, the tourist who has been used to mountain scenery or wooded country, will find, in seeking a change of environment, a very interesting and delightful trip through New Jersey to Atlantic City.

Leaving New York, the ferry may be

ITINERARY.

NEW YORK-PHILADELPHIA.

New York-Atlantic City.

Miles	Miles
New York..... 0.0	Avon..... 66.7
Newark..... 8.9	Belmont..... 67.4
Elizabeth.... 15.1	Spring Lake... 69.0
Rahway..... 20.7	Seagirt..... 70.7
Perth Amboy.. 28.2	Manasquan.... 71.7
South Amboy.. 32.3	Brielle..... 72.7
Keyport..... 38.3	Pt. Pleasant... 74.3
Middletown.. 44.4	Burraville.... 75.7
Red Bank..... 49.3	Lakewood..... 84.0
Shrewsbury... 51.3	Toms River.... 84.0
Eatontown... 52.8	Bayville..... 86.4
Long Branch.. 57.4	Barneget..... 110.4
West End..... 59.0	Manahawken... 115.2
Elberon..... 60.7	Tuckerton.... 122.9
Deal..... 62.1	New Gretna... 129.6
Allenhurst... 63.1	Port Republic.. 136.3
Asbury Park... 64.3	Oceanville.... 140.7
Ocean Grove.. 65.2	Absecon..... 144.3
Bradley Beach. 65.7	Atlantic City.. 153.5

Atlantic City-Cape May.

Miles	Miles
Atlantic City... 0.0	Ocean View.... 26.8
Pleasantville.. 5.3	Cape May C. H. 35.6
Ocean City.... 14.9	Rio Grande.... 41.5
Seaville..... 24.6	Cape May..... 48.1

Cape May-Philadelphia.

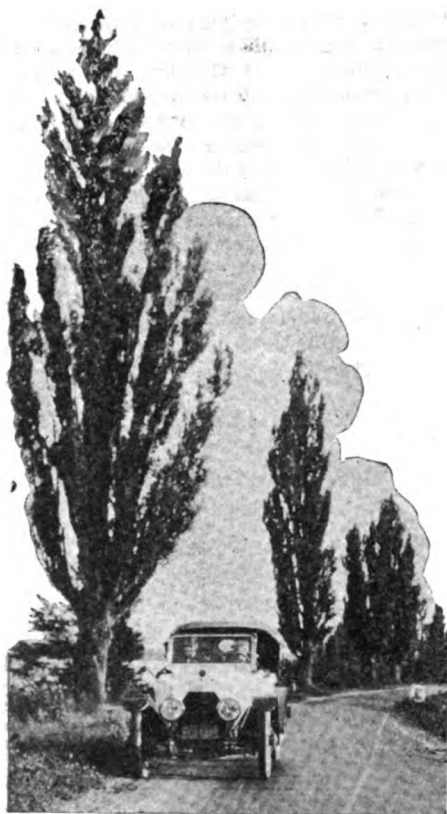
Miles	Miles
Cape May..... 0.0	Franklinville.. 62.4
Cape May C. H. 13.1	Clayton..... 65.0
Dennisville... 22.0	Glassboro.... 67.7
Eldora..... 27.0	Hurffville.... 72.3
Leesburg..... 33.2	Westville.... 80.0
Mauricetown.. 37.3	Gloucester.... 80.9
Millville..... 46.8	Camden..... 85.5
Vineland..... 53.3	Philadelphia... 85.5



Thousands of People Bathe in the Surf at Atlantic City.

New York To Plattsburg

Tour Through the Hudson Valley To the American Training School For Officers



Beautiful Trees Line the Roadways for Miles in the Lake Country.

ONE of the most popular tours from New York City for the past several years has been the trip through the Hudson Valley to Plattsburg, where thousands of the officers who are now in France with the Liberty Army, were trained.

It can be reached from almost any part of New England, New York state or Canada by direct routes, but the most interesting route is that from New York City.

This route lies in the beautiful Hudson valley on the east shore to Rensselaer, where a crossing is made into Albany. From there the road goes along the west bank of the Hudson, passing Saratoga lake into Saratoga Springs.

Continuing in a northerly direction the route runs into that scenic section of Vermont laying along Lake George and Lake Champlain, and passing through Sudbury, Vergennes, Burlington and St. Albans. From the latter place a part land and part water route is taken over to Chazy on the west bank of Lake Champlain, which is an excellent trip.

Foothills of the Adirondacks.

The tourist is now within a few miles of the beautiful camping grounds on the shore of the lake and in the foot hills of the Adirondack mountains. The camp overlooks Cumberland bay and was start-

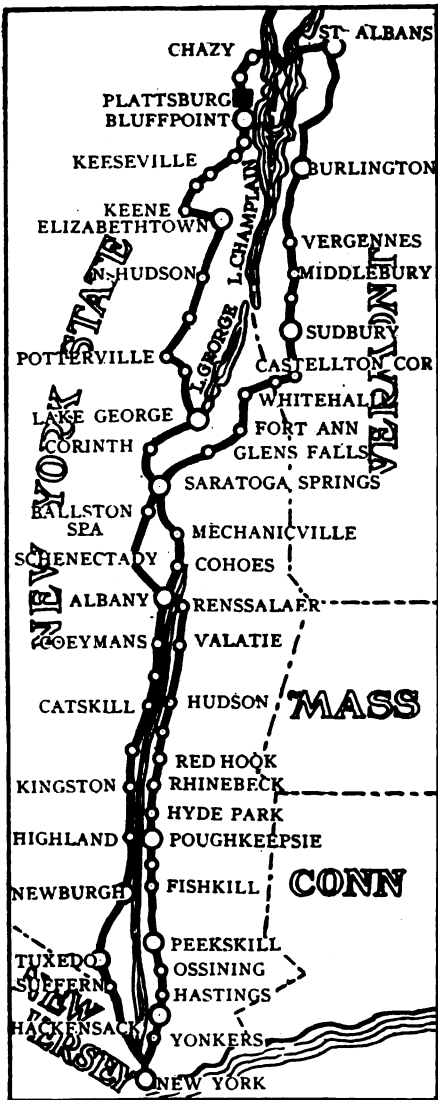
ed years ago as a training grounds for business men who wished to become proficient in the manual of arms.

The return trip is made southward through the eastern fringe of the Adirondacks and lays through a country that for scenic grandeur and beauty has no equal in this country. The mountains stretch out in long chains, breaking up the horizon on the west, while to the eastward lies a net work of lakes and streams which as a whole resemble a gigantic park system. In the fall of the year the ride down through Elizabethtown to Lake George is enchanting. The atmosphere has a noticeable crispness and is clear and dry, which, combined with the scent of the mountain air and turning foliage, creates an environment that is greatly exhilarating.

Lake George is at the southern extremity of the lake by that name and has figured prominently in American history for nearly 300 years. Fr. Isaa Jogues, a French priest, discovered the lake in 1642 and he was killed there by the Iroquois Indians in 1646. General Johnson, who camped at its head in 1755, gave the lake its present name in honor of British King, George the Second. It has often been called Horicon, as this name was used in referring to it by James Fennimore Cooper in his famous stories, which were based on Indian life and settlements



Excellent Highways Wind Through the Hills Along the Ausable River on the Route to Lakes George and Champlain and to Plattsburg.



The Tourists' Route Map.

about the lake. It was also the scene of battles between the French and English and the French and Indians.

Reminders of the Revolution.

The ruins of Fort George, which was built in 1759 by Amherst, still stand in the state park east of the railway station in Lake George. During the revolutionary war the fort was used by an English command as a military post until Col. Bernard Romans captured it in 1775. The spot is now marked by a battle monument erected there in 1903 by the Society of Colonial Wars to commemorate the event.

The country is rich in historic lore, as well as impressive and beautiful scenery. The route from Lake George to Saratoga lies through Corinth, a picturesque town, and also intersects several small villages. From this point the same route as was taken on the trip up from Albany may be followed in returning. Another way, slightly longer, passing through Ballston Spa and Schenectady, offers the tourist scenery and points of interest that warrant the extra driving. At Schenectady are the great works of the General Electrical Company and a number of other thriving industries.

Entering Albany the tourist should continue on through Central avenue on to State street as far as the State capitol, which is one of the finest specimens of French renaissance style in America. The building was in the course of erection for over 30 years, during which time more than \$25,000,000 was spent upon it.

100 Miles Along the Hudson.

From Albany to New York City the road runs close to the west bank of the Hudson river for nearly 100 miles into Newburgh, and through a section that became famous in Colonial times owing to its close identification with the movement of the Continental armies. Kingston, one of the places passed through on this leg of the tour, was the first place of meeting of the New York state legislature in 1676. It was burned by the British in 1777.

Newburgh, the last stop before winding through New Jersey to the New York ferry, is situated in a wonderful location on the banks of the Hudson and presents a grand picture from the river, with the water in the foreground and the mountains in the distance. It was settled by refugees from the Franco-German war in 1708 and was named Newburgh in 1743. The old Hasbrouck house, which was used by Gen. Washington as headquarters in 1782-83, is the principal point of interest in the city and is visited by hundreds of tourists. The "Tower of Victory," which was erected to commemorate the close of the Revolutionary war, stands in the park that was formerly the grounds of the Hasbrouck house. From this point Beacon Hill, on the other side of the Hudson, may be seen. A monument now marks the spot on the hill where fires were burned during the Revolutionary war. There are numerous other points of historic interest about Newburgh, including the Old Mansion, where the "Dutch loan" was deposited. The old court house, which is opposite the hotel, is one of the imposing specimens of architecture of which there are quite a number. A fine view of the surrounding country may be obtained from the observatory in Downing park, and the tourist will find a visit to the Temple Hill monument very interesting. It marks the site of the general headquarters and the temple in which the society of the Cincinnati was first organized and where the first meeting of that famous organization was held.

The tourist who is well posted on Revolutionary war history will enjoy this section of his trip more than any other part and can spend a long time in delving into the archives that are available, in addition to sight seeing among the historic spots so closely identified with the nation's birth.

Out of Newburgh the road runs along the route of the Erie railroad and the Ramapo river into Tuxedo, where there is a colony of very wealthy New York people, who maintain many palatial residences about the city and Tuxedo lake. The route continues along the west bank of Ramapo into Hillburn,

where a bridge is crossed leading into Suffern, the last place in New York state. The remainder of the trip is through Ridgewood and Hackensack, N. J., to Edgewater, where the ferry, which runs every 20 minutes, is taken for 130th street, New York City.

Generally speaking, this trip should not require more than a week from start to finish, allowing for a day at Plattsburg, or any other place the motorist may choose. The total mileage for the round trip is approximately 712 miles, the outward journey being about 369 miles and the return 343 miles.

ITINERARY.

New York-Poughkeepsie.

Miles	Miles
New York..... 0.0	Peekskill..... 40.6
Yonkers..... 12.7	Cold Spring..... 52.0
Irvington..... 20.4	Fishkill..... 59.3
Tarrytown..... 23.1	Wappinger's..... 67.4
Ossining..... 29.3	Poughkeepsie..... 74.8

Poughkeepsie-Albany.

Poughkeepsie..... 0.0	Stuyvesant F..... 50.0
Hyde Park..... 6.1	Kinderhook..... 53.8
Rhinebeck..... 16.2	Schockack..... 67.3
Red Hook..... 22.1	E. Greenbush..... 69.0
Blue Stores..... 31.1	Rensselaer..... 73.5
Hudson..... 41.3	Albany..... 74.5

Albany-Saratoga.

Albany..... 0.0	Mechanicville..... 22.6
Cohoes..... 12.1	Maltaville..... 28.7
Waterford..... 14.0	Saratoga..... 39.0

Saratoga-Sudbury.

Saratoga..... 0.0	Whitehall..... 43.1
Glens Falls..... 19.0	Fairhaven..... 53.6
Sandy Hill..... 22.7	Castleton Cor..... 57.0
Kennedy..... 27.2	Sudbury..... 61.0

Sudbury-Burlington.

Sudbury..... 0.0	Shelburne..... 41.0
Cornwall..... 10.7	Burlington..... 47.9
Vergennes..... 25.9	

Burlington-St. Albans.

Burlington..... 0.0	Milton..... 16.0
Winooski..... 3.0	Georgia..... 22.0
Colchester..... 8.0	St. Albans..... 28.0

St. Albans-Plattsburg.

St. Albans..... 0.0	Isle La Motte..... 26.0
Swanton..... 9.0	Chazy Landing..... 28.0
Swanton Ferry..... 18.0	Ingraham..... 34.2
Alburg Centre..... 21.5	Plattsburg..... 43.0

Plattsburg-Elizabethtown.

Plattsburg..... 0.0	Upper Jay..... 37.3
Keeseville..... 15.8	Keene..... 43.4
Ausable..... 27.6	Hull Corners..... 45.4
Jay..... 33.6	Elizabethtown..... 56.1

Elizabethtown-Saratoga.

Elizabethtown..... 0.0	Warrensburg..... 62.8
Scroon River..... 22.6	Lake George..... 69.3
Pottersville..... 41.2	Glens Falls..... 79.3
Chestertown..... 50.1	Saratoga..... 97.5

Saratoga-Albany.

Saratoga..... 0.0	Schenectady..... 22.6
Ballston..... 6.7	Albany..... 37.6
Burnt Hills..... 14.3	

Albany-Kingston.

Albany..... 0.0	Evesport..... 44.7
Coeymans..... 13.4	Saugerties..... 47.9
Coxsackie..... 24.6	Glenrie Falls..... 50.7
Catskill..... 35.9	Kingston..... 59.6

Kingston-Newburgh.

Kingston..... 0.0	Marlboro..... 26.3
Ulster Park..... 7.5	Newburgh..... 34.9
Highland..... 17.8	

Newburgh-New York City.

Newburgh..... 0.0	Ramapo..... 31.0
Vails Gate..... 4.8	Suffern..... 32.9
Highland Mills..... 13.5	Hohokus..... 41.7
Southfield..... 21.7	Hackensack..... 51.4
Tuxedo..... 26.4	130th St. Ferry..... 58.2

Itineraries of Miscellaneous Tours

Routes in the South, Northwest and Northeast Indicated on Master Map, Pages 14-15

ITINERARY.

WASHINGTON-NEW ORLEANS.

Night Stops—Richmond, Va.; Henderson, Winston-Salem and Charlotte, N. C.; Greenville, S. C.; Atlanta, Ga.; Montgomery, Thomaston and Mobile, Ala.; Gulfport, Miss.; New Orleans, La. Eleven Days, 1425.8 Miles.

Washington-Richmond.

Miles	Miles
Washington... 0.0	Fredericksburg 59.4
Alexandria, Va. 7.2	Massaponax ... 68.8
Lorton 19.4	Castelman's Mill 74.7
Occoquan 22.9	Golanville..... 87.9
Dumfries 33.6	Ashland 104.3
Stafford 50.0	Richmond 121.6

Richmond-Henderson.

Miles	Miles
Richmond 0.0	Thelma 102.8
Petersburg ... 22.7	King's Cross Roads 103.9
Carson 37.6	Sunlight 105.2
Loco 51.6	Littleton 110.5
Jarrat 57.4	Vaughan 116.3
Emporia 67.3	Macon 121.7
Brink 75.0	Warrenton 127.4
Barley 81.9	Afton 132.2
Roanoke Rapids, N. C. 93.7	Henderson 145.9
Holden 96.1	

Henderson-Winston-Salem.

Miles	Miles
Henderson 0.0	Graham 86.4
Oxford 11.7	Burlington ... 89.3
Providence ... 17.4	Gibsonville ... 96.0
Tallyho 22.6	Whitsett Cross Roads 98.7
Stem 23.9	Greensboro ... 112.3
Knapp of Reeds 28.6	Gulldford 118.0
Bragtown 40.2	Summerfield ... 124.7
Durham 43.5	Kernersville ... 136.4
Chapel Hill... 55.6	Centerville ... 146.2
White Cross... 64.6	Winston-Salem 148.5
Saxapahaw ... 74.3	

Winston-Salem-Charlotte.

Miles	Miles
Winston-Salem 0.0	Landis 46.5
Midway 13.7	Kannapolis ... 51.2
Brinkleys 16.9	Concord 59.1
Lexington 23.9	Pharr's Mill... 65.3
Spencer 38.5	Newell 73.7
Sallabury 41.3	Charlotte 81.5
China Grove... 44.1	

Charlotte-Greenville.

Miles	Miles
Charlotte 0.0	Cowpens 71.0
Sloane's Ferry 10.9	Converse 74.1
Belmont 12.6	Spartanburg ... 80.5
Lowell 17.3	Fair Forest... 85.8
Gastonia 22.8	Tucapau 92.3
Bessemer City 29.6	Duncan 96.9
King's Mtn... 35.6	Greer 102.0
Grover 43.7	Taylors 107.6
Blackab'g, S. C. 50.0	Greenville ... 117.3
Gaffney 59.1	

Greenville-Atlanta.

Miles	Miles
Greenville 0.0	Jefferson 115.1
Oak Grove.... 9.4	Winder 118.7
Piedmont 11.6	Carl 124.7
Anderson 32.6	Lawrenceville 137.0
Fair Play 55.6	Snellville 144.4
Lavonia, Ga. ... 65.8	Stone Mountain 154.8
Bowersville ... 71.4	Clarkson 159.8
Canon 73.8	Scottdale 161.0
Royston 78.3	Ingleside 163.0

Franklin Spgs. 80.5	Decatur 164.6
Pocataligo 93.2	Kirkwood 166.5
Commerce 105.7	Atlanta 170.7
Apple Valley... 110.2	

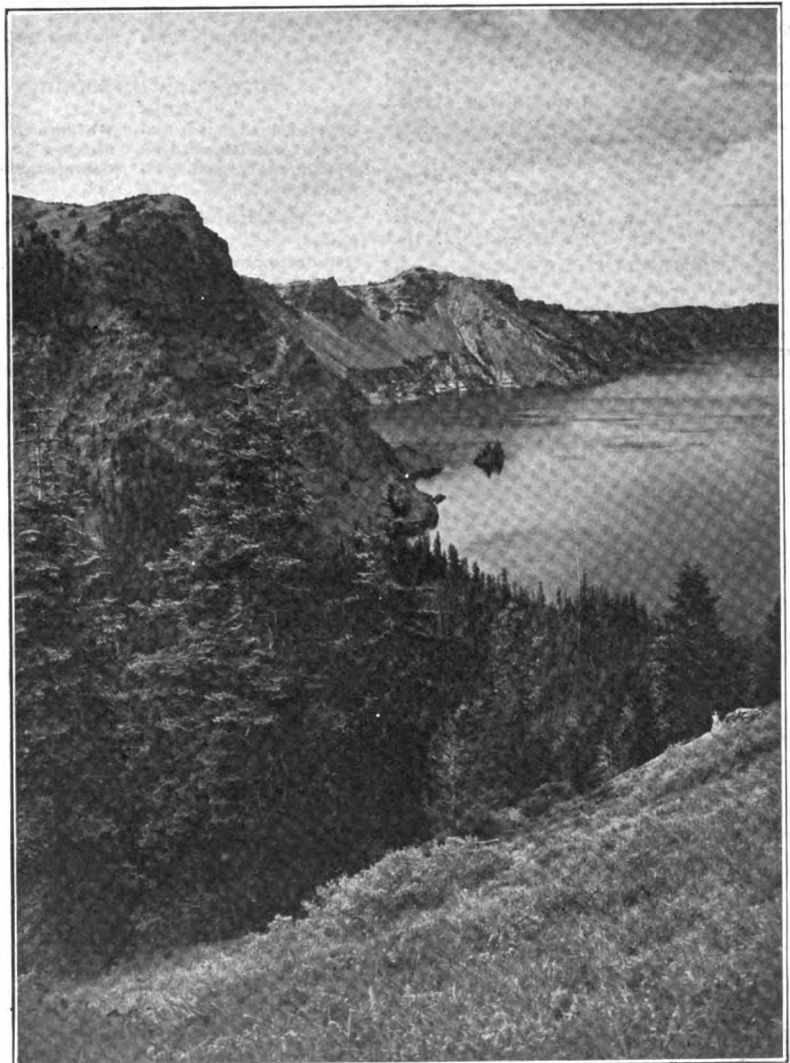
Atlanta-Montgomery.

Miles	Miles
Atlanta 0.0	La Grange 74.9
College Park.. 8.9	West Point.... 90.2
Red Oak 12.6	Langdale 95.1
Fairburn 19.7	Beulah 105.6
Palmetta 26.0	Opelika 120.0
McCullom 31.4	Tuskegee 146.5
Madras 34.3	La Place..... 158.8

Belolt 62.3	Shiloh 109.9
Hazen 65.4	Clay Hill..... 118.1
Orrville 69.3	Thomasville ... 127.2

Thomasville-Mobile.

Miles	Miles
Thomasville ... 0.0	Chastang 81.8
Grove Hill.... 16.4	Axis 90.2
Jackson 33.3	Creola 92.3
Leroy 40.0	Pennsylvania.. 93.5
McIntosh 62.7	Saraland 97.3
Malcolm 69.5	Plateau 103.7
Calvert 73.1	Mobile 106.9
Mount Vernon. 78.3	



Crater Lake National Park Reached from Medford on Pacific Highway. (See Pages 14 and 51.)

Newman 41.0	Shorter 163.0
Moreland 48.5	Meigs 175.2
St. Charles... 50.0	Montgomery ... 187.7
Grantville ... 54.4	

Montgomery-Thomasville.

Miles	Miles
Montgomery ... 0.0	Martins 72.5
Prattville ... 13.8	Safford 76.7
Autaugaville.. 25.5	Central Mills.. 81.5
Mulberry 34.2	Corley 84.0
Stateville ... 37.7	Conaul 88.5
Burnsville ... 41.2	Thomaston ... 93.2
Seima 50.2	Octagon 103.7

Mobile-Gulfport.

Miles	Miles
Mobile 0.0	W. Pascagoula 41.7
Mertz, Ala.... 4.0	Ocean Springs. 52.3
Orange Grove, Miss. 34.0	Biloxi 71.9
Pascagoula ... 39.8	Mississippi City 80.6
	Gulfport 84.0

Gulfport-New Orleans.

Miles	Miles
Gulfport 0.0	Poplarville ... 53.5
Long Beach... 3.1	Bogalusa 88.7
Pass Christian. 8.0	Clalborne 116.8
Cuevas 10.6	Covington 117.4

Vidalia	22.1	Mandeville	127.4
Standard	27.8	New Orleans	134.5

ITINERARY. MERIDIAN ROAD.

Night Stops—Winnipeg, Fargo, Yankton, Salina, Wichita, El Reno, Wichita Falls, Ft. Worth, Waco, San Antonio, Laredo, Galveston.

Winnipeg-Fargo.

	Miles		Miles
Winnipeg	0.0	Minto	128.0
St. Norbert . . .	10.0	Ardoch	135.0
Morris	41.5	Manville	146.9
Emerson Can. . .	69.3	Grand Forks . .	158.8
Pembina	73.1	Hillaboro	299.9
Grafton	117.1	Fargo	254.4

Fargo-Yankton.

	Miles		Miles
Fargo	0.0	Watertown	178.0
Abercrombie ...	33.0	Arlington	217.0
Wahpeton	51.5	Madison	245.0
White Rock...	76.7	Salem	278.5
Slaseton	116.2	Bridgewater ..	295.5
Summit	146.5	Yankton	347.7

Yankton-Columbus.

	Miles		Miles
Yankton	0.0	Norfolk	67.0
Wausa	31.6	Madison	82.8
Pierce	52.6	Columbus	118.3

Columbus-Belleville.

	Miles		Miles
Columbus	0.0	Belvidere	95.7
Shelby	18.8	Hebron	103.2
Stromsburg . . .	32.6	Chester	115.7
Brunning	89.2	Belleville	128.8

Belleville-Salina.

	Miles		Miles
Belleville	0.0	Minneapolis . . .	55.1
Concordia	21.6	Salina	80.4

Salina-Wichita.

	Miles		Miles
Salina	0.0	Moundridge....	57.9
Lindsborg	23.4	Newton	77.7
McPherson	37.5	Wichita	102.7

Wichita-El Reno.

	Miles		Miles
Wichita	0.0	Medford	80.5
Wellington	31.3	Kremilin	103.1
South Haven	46.2	Enid	117.2
Caldwell	58.1	Hennessey	138.7
Renfrow	68.2	El Reno	186.7

El Reno-Lawton.

	Miles		Miles
El Reno.....	0.0	Verdon	58.6
Pocasset	37.0	Apache	87.7
Chickasha	47.9	Lawton	114.7

Lawton-Wichita Falls.

	Miles		Miles
Lawton	0.0	Toll House....	42.9
Emerson	18.8	Burkburnett...	45.3
Randlett	33.9	Wichita Falls.	60.3

Wichita Falls-Ft. Worth.

	Miles		Miles
Wichita Falls.	0.0	Whitt	87.5
Windthorst ...	25.8	Weatherford ..	108.2
Antelope	39.0	Annetta	116.1
Jacksboro	65.3	Ft. Worth.....	142.2

Ft. Worth-Waco.

	Miles		Miles
Ft. Worth.....	0.0	Meridian	89.0
Cleburne	35.0	Clifton	101.0
Glenrose	62.0	Waco	140.0

Waco-San Antonio.

	Miles		Miles
Waco	0.0	Austin	131.0
Temple	53.0	San Antonio...	213.0
Georgetown ..	105.0		

San Antonio-Laredo.

	Miles		Miles
San Antonio...	0.0	Cactus	135.5
Pearshall	56.0	Nye	155.5
Cotulla	95.5	Laredo	164.0

Branch. Waco-Galveston.

	Miles		Miles
Waco	0.0	Navasota	145.0
Marlin	27.0	Hempstead	169.0
Hearne	93.0	Houston	221.0
Bryan	115.0	Galveston	273.0

ITINERARY. ST. LOUIS-CHICAGO.

Night Stops—St. Louis, Mo.; Springfield, Bloomington and Chicago, Ill. Three Days, 333.8 Miles.

St. Louis-Springfield.

	Miles		Miles
St. Louis.....	0.0	Staunton	44.6
E. St. Louis.....	2.1	Mt. Olive.....	51.0
Collinsville.....	12.9	Litchfield	61.9
Troy	15.9	Glenarm	93.5
Marysville.....	17.1	Cotton Hill.....	99.7
Edwardsville.....	25.4	Springfield.....	107.8
Hamel	33.6		

Springfield-Bloomington.

Miles		Miles	
Springfield . . .	0.0	McLean	58.4
Williamsville . .	15.0	Shirley	69.6
Elkhart	23.0	Bloomington . .	76.5
Lincoln	37.5		

Bloomington-Chicago.

	Miles		Miles
Bloomington ..	0.0	Minooka	92.7
Towanda	8.2	Joliet	106.6
Lexington	18.3	Lockport	116.6
Pontiac	41.2	LaGrange	130.1
Odell	52.0	Forest Park	139.6
Dwight	60.1	Chicago	149.5
Morris	79.4		

ITINERARY. NATIONAL PARKS HIGHWAY. BOSTON, MASS.-SEATTLE, WASH.

Night Stops—Boston, Mass.; Springfield, Albany, N. Y.; Utica, Rochester, Erie, Penn.; Cleveland, O.; Toledo, South Bend, Ind.; Chicago, Ill.; Madison, Wis.; La Crosse, St. Paul, Minn.; Alexandria, Fargo, N. D.; Jamestown, Bismarck, Dickinson, Terry, Mont.; Custer, Livingston, Butte, Drummond, Wallace, Idaho; Spokane, Wash.; Waterville, Seattle. Thirty Days, 3486 Miles.

Boston-Springfield.

	Miles		Miles
Boston	0.0	Worcester	43.4
Auburndale ...	9.3	Spencer	54.4
S. Sudbury....	20.0	Warren	67.4
Northboro	33.4	Springfield	94.4

Springfield-Albany.

	Miles		Miles
Springfield	0.0	Pittsfield	55.3
Westfield	8.8	W. Lebanon	70.3
Huntington	21.0	Nassau	79.1
Pera	41.4	Albany	92.0

Albany-Utica.

	Miles		Miles
Albany	0.0	St. Johnsville..	61.7
Schenectady....	15.0	Little Falls....	72.2
Amsterdam.....	30.8	Herkimer	79.4
Fonda	41.5	Utica	95.0

Utica-Rochester.

	Miles		Miles
Utica	0.0	Savannah	86.0
Oneida	23.5	Lyons	100.9
Fayetteville	43.0	Palmyra	116.6
Syracuse	50.6	Fairport	128.9
Elbridge	66.1	Rochester	138.9

Rochester-Erie.

Miles		Miles	
Rochester	0.0	Buffalo	73.7
Wergen	18.1	Irving	102.5
Batavia	34.5	Brocton	124.6

Pembroke	47.7	Northeast	148.3
Williamsville	63.9	Erie	163.6

Erie-Cleveland.

	Miles		Miles
Erie	0.0	Madison	61.3
Conneaut	30.2	Painesville	72.3
Ashtabula	44.7	Willoughby	83.0
Geneva	54.5	Cleveland	102.0

Cleveland-Toledo.

	Miles		Miles
Cleveland	0.0	Bellevue	76.6
Elyria	28.7	Woodville	100.3
Norwalk	57.3	Toledo	119.4

Toledo-South Bend.

	Miles		Miles
Toledo	0.0	Butler	84.9
Delta	32.8	Kendallville..	106.4
Archbold	51.6	Goshen	142.6
Bryan	66.2	Elkhart	153.1
Edgerton	78.0	South Bend...	166.4

South Bend-Chicago.

	Miles		Miles
South Bend...	0.0	Valparaiso	49.4
New Carlisle..	13.9	Dyer	74.1
La Porte.....	26.7	Hammond	83.9
Westville	38.6	Chicago	104.9

Chicago-Madison.

	Miles		Miles
Chicago	0.0	Racine	66.0
Evanston	13.3	S. Milwaukee	80.0
Hubbard's Hill	19.0	Milwaukee	89.4
Ravina Park	22.9	Brookfield	102.6
Highland Park	25.5	Waukesha	104.3
Lake Forest	32.0	Delafield	117.0
Waukegan	39.5	Johnson Creek	137.6
Zion City	45.7	Lake Mills	144.4
Kenosha	55.3	Madison	170.8

Madison-La Crosse.

	Miles		Miles
Madison	0.0	Union Center...	79.5
Ashton	10.1	Elroy	84.1
Sauk City.....	24.9	Kendalls	91.2
Baraboo	42.2	Ontario	104.8
Abelmanns	51.6	Cashot	115.0
Reedsburg	59.8	Portland	120.8
Lavalle	67.6	La Crosse	145.6

La Crosse-St. Paul.

Miles		Miles	
La Crosse.....	0.0	St. Charles....	59.1
Ridgeway	21.0	Rochester	81.0
Witoka	24.6	Pine Island.....	90.1
Winona	34.1	Zumbrota	105.6
Lewiston	48.6	Cannon Falls....	125.5
Utica	53.2	St. Paul.....	162.1

St. Paul-Alexandria.

	Miles		Miles
St. Paul.....	0.0	St. Cloud.....	76.2
Minneapolis.....	9.9	St. Joe.....	83.5
Osseo.....	22.2	Avon.....	90.8
Anako.....	28.4	Albany.....	97.9
Elk River.....	40.0	Melrose.....	112.9
Becker.....	56.9	Sauk Center.....	121.8
Clear Lake.....	63.9	Alexandria.....	148.7

Alexandria-Fargo.

	Miles		Miles
Alexandria....	0.0	Fergus Falls..	54.3
Garfield	7.1	Rothsay	77.3
Evansville ...	19.8	Barnesville ...	94.4
Melby	25.7	Fargo	124.2

Fargo-Jamestown.

	Miles		Miles
Fargo	0.0	Jamestown ...	90.0
Valley City....	61.3		

Jamestown-Bismarck.

	Miles		Miles
Jamestown	0.0	Bismarck	106.5
Dawson	55.2		

Bismarck-Dickinson.

	Miles		Miles
Bismarck.....	0.0	Dickinson	120.3
Hebron	79.2		

Dickinson-Terry.

Miles	Miles
Dickinson 0.0	Fallon .....149.5
Scythian Butte 60.4	Terry .....160.7
Glendive .....116.0	

For itinerary from Terry to Spokane, see Yellowstone Trail itinerary, which is over the same route.

Spokane-Waterville.

Miles	Miles
Spokane	Almira
Davenport	Coulee City
Creston	Waterville

Waterville-Cle Elum.

Miles	Miles
Waterville	Peashastin
Wenatchee	Cle Elum

Cle Elum-Seattle.

Miles	Miles
Cle Elum	North Bend
Easton	Redmond
Laconia	Seattle

ITINERARY.
PACIFIC HIGHWAY.

Night Stops—Vancouver, B. C.; Seattle and Chehalis, Wash.; Portland, Salem, Cottage Grove, Riddle and Medford, Ore.; Sisson, Redding, Chico and Sacramento, San Francisco, Paso Robles, Los Angeles, San Diego, Cal. Fourteen Days, 18,448 Miles.

Vancouver-Seattle.

Miles	Miles
Vancouver	Bow
New Westminster	Mt. Vernon
Brownsville	Conway
Bialne, Wash.	English
Custer	Shohomish
Barnsdale	Kenmore
Bellingham	Seattle

Seattle-Chehalis.

Miles	Miles
Seattle	Rainier
Christopher	Olympia
Tacoma	Centralia
South Tacoma	Chehalis

Chehalis-Portland.

Miles	Miles
Chehalis	Carrollton
Cowlitz	Kalama
Toledo	Woodlawn Ferry
Castle Rock	La Centre
Lexington	Vancouver
Kelso	Portland, Ore.

Portland-Salem.

Miles	Miles
Portland	Salem
Oregon City	

Salem-Cottage Grove.

Miles	Miles
Salem	Junction City
Jefferson	Eugene
Albany	Goshen
Hamsburg	Cottage Grove

Cottage Grove-Riddle.

Miles	Miles
Cottage Grove	Roseburg
Kreweon	Dole
Yoncalles	Myrtle Creek
Oakland	Riddle

Riddle-Medford.

Miles	Miles
Riddle	Gold Hill
Wolf Creek	Central Point
Grant's Pass	Medford

Medford-Sisson.

Miles	Miles
Medford	Montague
Siakiyou Pass	Edgewood
Coles	Weed
Hornbrook	Sisson

Sisson-Redding.

Miles	Miles
Sisson	Southern
Shasta Springs	Kennett
Dunsmuir	Huckeye
Castle Brook	Redding
Castella	

Redding-Chico.

Miles	Miles
Redding	Proberta
Anderson	Vina
Cottonwood	Chico
Red Bluff	

Chico-Sacramento.

Miles	Miles
Chico	Lincoln
Live Oaks	Roseville
Marysville	Ben All
Wheatland	Sacramento
Sheridan	

Sacramento-San Francisco.

Miles	Miles
Sacramento	Livermore
Stockton	Oakland
French Camp	San Francisco

San Francisco-Santa Cruz.

Miles	Miles
San Francisco	Santa Clara
Colma	San Jose
San Mateo	Los Gatos
Redwood	Santa Cruz

Santa Cruz-Paso Robles.

Miles	Miles
Santa Cruz	Chualar
Aptos	Soledad
Watsonville	Bradley
Salinas	Paso Robles

Paso Robles-Santa Barbara.

Miles	Miles
Paso Robles	Sisquoc
San Luis Obispo	Los Olivos
Edna	Gaviota
Arroyo Grande	Goleta
Santa Maria	Santa Barbara

Santa Barbara-Los Angeles.

Miles	Miles
Santa Barbara	El Rio
Carpenteria	Hollywood
Ventura	Los Angeles

Los Angeles-San Diego.

Miles	Miles
Los Angeles	Irvine
Whittier	Oceanside
La Harba	Encinitas
Fullerton	La Jolla
Santa Ana	San Diego

ITINERARY.
PORTLAND-MONTREAL.

Night Stops—Portland, Augusta, Me.; Quebec, Montreal, P. Q. Three Days, 459.5 Miles.

Portland-Augusta.

Miles	Miles
Portland	Auburn
Morill's Cor.	Lewiston
Allen's Corner	Greene
Gray	Winthrop
North Gray	Manchester
U. Gloucester	Augusta

Augusta-Lake Parlin.

Miles	Miles
Augusta	Solon
Waterville	Bingham
Fairfield Cen.	Carratunk
Skowhegan	The Forks
Lakewood	Lake Parlin

Lake Parlin-Quebec.

Miles	Miles
Lake Parlin	Beauceville
Jackman, Me.	Des Plantes
Moore R., Me.	St. Joseph
Line House	Beauce Junction
Armstrong, P. Q.	Ste. Marie
Jersey	Scott Junction
St. George	St. Henri
Gilbert	Quebec

Quebec-Montreal.

Miles	Miles
Quebec	Pointe du Lac
St. Augustin	Yamachiche
Les Entrepuils	Wainnonge
Can Sante	Perthier
Portneuf	Lanoraie

Deschambault	Lavaltrie
La Chevrotiere	St. Sulpice
Grondines	L'Assomption
Champlain	Charlemagne
Three Rivers	Montreal

ITINERARY.
MONTREAL-ALBANY.

Night Stops—Montreal, Ottawa, Kingston, Toronto, Can.; Buffalo, Syracuse and Albany, N. Y. Six Days, 846.2 Miles.

Montreal-Ottawa.

Miles	Miles
Montreal	Hawkesbury
St. Laurent	L'Original
Bois de Plouffe	Caasbura
St. Martin	Alfred
St. Eustace	Plantagenet
St. Benoit	Wendover
St. Placide	Clarence
St. Andrews E.	Rockland
Carrillon	Cumberland
Ferry to Point Fortune	Orleans
Little Rideau	Ottawa

Ottawa-Kingston.

Miles	Miles
Ottawa	Iroquois
S. Gloucester	Cardinal
Metcalf	Prescott
Ormond	Brookville
Winchester	Lyn Village
Cass Bridge	Gananoque
Williamsburg	Kingston

Kingston-Toronto.

Miles	Miles
Kingston	Cobourg
Cataraqui	Wellcome
Napanee	Newcastle
Maryville	Boumanville
Shannonville	Oshawa
Belleville	Whitby
Trenton	Pickering
Brighton	Liverpool
Colborne	Riverdale
Grafton	Toronto

Toronto-Buffalo.

Miles	Miles
Toronto	Vineland
Cookville	Jordan
Erlindale	St. Catharines
Trafalgar VII.	Homer
Appleby	St. David
Freeman	Stamford
Aldershot	Niagara Falls
Hamilton	Echota Station
Stony Creek	La Salle
Winona	N. Tonawanda
Grimshy	Tonawanda
Beamsville	Buffalo

Buffalo-Syracuse.

Miles	Miles
Buffalo	Yellow Mills
Williamsville	Palmyra
Clarence	E. Palmyra
Pembroke	Newark
N. Pembroke	Lyons
Batavia	Lock Berlin
Byron	Clyde
Bergen	Savannah
Churchville	Montezuma
North Chili	Port Byron
Rochester	Weedsport
Brighton	Elbridge
Walport	Camillus
Macedon	Syracuse

Syracuse-Albany.

Miles	Miles
Syracuse	West Schuyler
Fayetteville	Hlon
Mycenae	Herkimer
Sullivan	Little Falls
Canastota	St. Johnsville
Wamsville	Palatine Bridge
Oneida	Yost's Station
Oneida Castle	Fonda
Vernon	Aiken
Kirkland VII.	Amsterdam
New Hartford	Scotia
Utica	Schenectady
Deerfield	Albany

Appropriate Motor Wear for the War Worker

A Comfortable Coat and Well Tailored Suit Essential

By MRS. A. SHERMAN HITCHCOCK.

NEVER since motor cars became an accepted conveyance have they been more needed for touring purposes than at the present time. Never has the motor woman, who has been grimly working all through the winter months at her appointed tasks of Red Cross work, or other government duties, more greatly needed relaxation and an opportunity to increase her health and efficiency in the out-of-doors by touring trips to the mountains, beaches, lakes or anywhere back to the beauties and wonders of nature and the vast play grounds of our own beautiful America. The dreams of summer which the motor woman anticipated throughout the long, cold winter days are now to be realized. "What is so rare as a day in June?" the poet has asked.

There is patriotism, too, in the motor car vacation, for we are all aware that the railroads of our country are staggering under their present overburden of freight traffic. So it is that all unnecessary passenger traffic should be kept to the minimum in order to facilitate the handling of the greatly needed war commodities. These splendid motor tours will bring back large numbers of women, revitalized and reenergized, who, during their healthful outdoor vacation have gained new visions and increased enthusiasm for a return to their tasks to aid in every way in which a woman can in bringing a wonderful peace to all the world.

The first necessity for every motor wardrobe is a smart and comfortable coat. Next, I should say, comes the well tailored suit. This is particularly true this season, because of the many forms of war relief work which are keeping a great many motor women—and especially those who own and drive cars—so actively employed and for which a suit is most appropriate and more comfortable than any other style of garment. Jumping in and out of the car 40 times a day or more and hurrying around from place to place, as the woman must do who has patriotically volunteered her car and her services to her country, the long coat becomes decidedly cumbersome and very much in the way, while a suit, well made and clinging, seems the very thing for this kind of action. While on a motor tour both the coat and suit have their respective uses and both are needed.

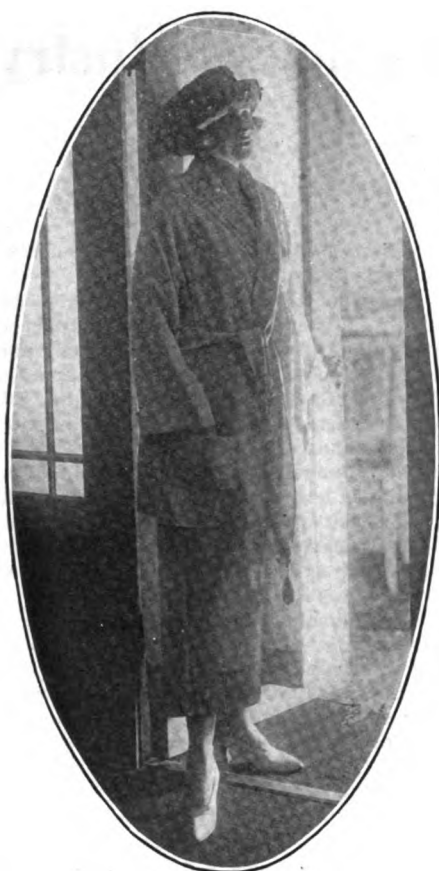
Any of the new rough-surfaced silks in subdued colors make the most ideal suits for the car. They are unobtrusive in color and design, patriotic in texture,

comfortable to wear and they are very durable, while—one other little thing that every daughter of Eve likes to feel whatever the circumstances may be—they are as smart and chic as a suit could possibly be. The rough silks most appropriate for this use are Ruff-A-Nuff, Roshanara Crepe, Amphora and Khaki-Kool, and they all come in the most charming of medium and dark shades. A beet-root Roshanara Crepe has a very narrow skirt and a little cutaway coat which has a rippling flounce effect at the bottom. There is but one button and button hole on the coat, well placed to break the line below the narrow shawl

collar. Rows of stitching edge the bottom of the coat and outline the small inset pockets, ending in the well finished arrow heads which indicate good workmanship. A motor hat designed to wear with this suit is of the beet-root Roshanara Crepe, with one long flat quill, which is faced with the crepe and wound around the entire hat. Whatever the modes may be a navy blue Pussy Willow satin frock is a safe cornerstone on which to build one's motor wardrobe. One just shown me at an exclusive shop has the straightest of skirts and the plainest of blouses—all, of course, in one-piece, as every well behaved motor



No motor wardrobe, whether for touring or ordinary motoring, should be without one of the new model Raynsters. They really seem to be a part of the motor equipment and prove themselves of incalculable value. The new models are very smart and up-to-the-minute and are of just the correct weight for warm weather.



Even to our motoring clothing the influence of the East has penetrated. You can see it in every line of this motor costume of oyster Roshanara Crepe, which is the material par excellence of the season. The chic motor hat is made of scarlet Roshanara Crepe, decorated with bobbing wooden beads.

(From J. M. Gidding & Co., N. Y. City.)
(Posed by Catherine Stout.)

frock should be. A tucked vest and rolling collar of white organdie and a girdle banded with black soutache braid are the only elaboration. A little navy blue satin hat, with a turned back brim securely fastened to the crown by a bow of moire ribbon, run through button holes and tied in a flat bow. A long veil of dark blue Indestructible Voile attached to the hat gives an added effect of trimming and is very practical as well. The voile may be bought by the yard and the edges either hemstitched or finished with a picot edge and is very smart and rather more out of the ordinary than the usual veil shown in the shops, besides possessing wearing qualities almost unbelievable. With a veil of this character the motor woman may wear over the face the little veil of hexagonal mesh with dots of soft chenille forming the border. This will keep the hair from blowing unpleasantly about the face, help to keep the hat in place and give that chic finished look to the motor woman's appearance when the heavier veil of the voile is not required.

The frocks for road wear may very well be the smart little one-piece affairs in Ruff-A-Nuff or Amphora, both materials particularly adapted for this kind of wear. There are a lovely variety of modish shades, as well as white and natural. The separate skirt, which

is having such a wonderful vogue this season, and several blouses, is most advisable and will meet a decidedly felt want. A skirt of Roshanara Crepe of heavy durable satin, or soft wool jersey, with a smart blouse matching the skirt in color, and some supplementary lingerie and tailored satin waists make up a very practical and appropriate part of the motor outfit. For the blouse matching the skirt in color I would in every instance recommend the Indestructible Voile, as it cannot be excelled in wearing qualities and comes in all shades. The white Pussy Willow satin and white Ruff-A-Nuff make ideal tailored waists and may be laundered repeatedly with the most gratifying success.

At one exclusive designers I recently saw a very smart simple little motor frock built for touring of Amphora in natural color, trimmed only with stitching and quite a number of the drop buttons of the material, and accompanied by a well cut motor coat of the same material, with Angora wool embroidery on

collar and cuffs for its only relief. This model was eminently fitted for hot weather motor touring. A little hat, made of the same material and trimmed with wool flowers in a soft, dull rose, over which was thrown a long veil of rose colored Indestructible Voile having wool embroidery in a block design at each end, completed a charming outfit.



There are hats for every motoring occasion and there are very many occasions where this model, with its protective brim for the face, will be greatly appreciated. It fits the head so well that it is not easily dislodged and the downward droop of the brim cannot be affected on any way by the breezes. This smart model is called the "Loretta," and is made of slipper straw and satin with trimming of vulture and eire ribbon.

(Courtesy Gage Brothers & Co., Chicago, Ill.)



Here is the littlest girl all arrayed for motoring in the very newest and up-to-date garments for kiddies. The coat is of black and white checked velour, with a white pique collar. It may also be had in navy serge. The hat of lacere straw fits the head so closely and so well that it cannot become easily dislodged.

(Courtesy Franklin Simon & Co., New York City.)

The motor tourist must give particular attention to the underwear question. With her entire outfit for the trip stowed away in a bag, or at most a motor trunk, it behooves her to fill its limited space with the things which have really proved their ever ready usefulness. One of the newest things of the season and one of the best is the athletic underwear, called the "Diana," and nothing can solve the motor woman's problem with more satisfactory results. The "Diana" garments are all made of sheer materials and are lace trimmed around the neck, armholes and at the bottom. They combine perfect comfort with a great excellence of fit and are a wonderful improvement over the garments of knitted type. The majority of women of today consider the knitted undergarments clumsy and burdensome and there are very many who do not wish to pay the high prices demanded for silk garments. Thus the "Diana" comes at a most opportune moment and will be a perfect boon to the touring motor woman. There is a lovely pale pink batiste, as soft and fine as silk, and several very lovely white materials. These come both in plain white and in soft corded effects of stripes and checks in all white. The lace used in trimming is very fine and of an attractive pattern and if the "Diana" garments show through the sheer blouse they are very attractive, instead of presenting the disfiguring appearance of the knitted garment. Some fashionable motorists who have already tried the "Diana" tell us they would not be without them.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration

The Boone Tire and Rubber Co. is having plans prepared for the construction of a plant at Waco, Tex., for the manufacture of motor car tires and tubes. The factory will have a daily capacity of 750 tires and the same number of tubes.

The Emil Grossman Manufacturing Co., Brooklyn, N. Y., has opened an office in New York for the transaction of export business. Sidney S. Frank will have charge of the office and all its products will be on display there.

The Mason Tire and Rubber Co. announces that the sales for the quarter ending April 30 were \$501,540.25. Net earnings for the second quarter were \$62,234.02. After allowing for preferred dividend requirements for the period more than 25 per cent. is applicable to the common stock.

The Maynard Steel Casting Co., Milwaukee, Wis., is now known as the Maynard Electric Steel Foundry Co. The

by 200 to be used for assembling. The company's output is 45 trucks a month.

Charles B. Bohn Foundry Co. is erecting a new factory which will be 300 by 300 feet and will have a capacity of 40,000 to 50,000 pounds of castings daily. The capital of the company is \$300,000 and the officers are: Charles B. Bohn, president; W. N. Kug, vice president; H. W. Holt, secretary and treasurer; O. F. Plumerfelt, manager.

The Shuler Axle Manufacturing Co., Detroit, incorporated for \$150,000, has obtained a plant in Louisville, Ky., with 40,000 square feet of floor space and will move to that city.

The Oakland Motor Car Co., Pontiac, Mich., has taken over operation of the local plant of the Northway Motor and Car Co. The plant is now working on a schedule of 300 engines daily.

The Corcoran Manufacturing Co., Cincinnati, O., has secured a plant in the Norwood suburb of Cincinnati and has

are Fred W. Stork, John A. Anderson, C. A. Pennell and G. W. Morley.

The New Era Spring and Specialty Co. of Grand Rapids, Mich., has purchased the plans, manufacturing rights, machinery and equipment of the Parradee Spring auto bumper. The inventor, Edward Parradee, will be construction superintendent.

The Ramsey-Alton Manufacturing Co., Portland, has a war contract amounting to \$500,000. It will manufacture parts of army trucks, such as axles, brake blocks and tongues. The working force will be trebled.

The Lincoln Motors Co. is erecting a new administration building at West Warren and Livernois avenues, and will be the third largest factory administration building in Detroit. It will be five stories high, 68 by 208 feet and of brick and Bedford stone exterior. The roof will be of green tile. A statue of Abraham Lincoln will be erected on the lawn.

The Edmunds & Jones Corporation, Detroit, has passed the regular quarterly dividend on common stock. From June 16, 1916, to Sept. 8, 1917, inclusive, dividends were paid at the rate of \$1 quarterly, while for the last two quarters the dividend was 25 cents a share. The regular quarterly 1½ per cent. dividend on preferred has been declared.

The Goodyear Tire and Rubber Co., Akron, O., announces that sales for the six months ending May 1, the first half of the fiscal year, exceeded \$66,000,000, showing an increase of 40 per cent. over the corresponding period of the present year. The company is now turning out 20,000 tires a day and is more than two months behind in its orders. A year ago the company had 300 women in its Akron plants. It now employs 3000 women and the number will be increased to 5000.

The Higrade Motors Co., Harbor Springs, Mich., elected the following officers at a recent meeting: President, J. Elmer Pratt; vice president, Frank Voorhels; secretary and treasurer, Lette Shay; consulting engineer, I. W. Coppock; superintendent of purchases and production, Lette Shay. The general sales and advertising offices will remain at Buffalo, N. Y.

The Power Truck and Tractor Co., Detroit, Mich., has leased the manufacturing building at Beard avenue and the Michigan Central railroad and will equip it with machinery.

The Cell-Beam Manufacturing Co., 1101 Bedford avenue, New York City, is marketing the Cell-Beam searchlight direct from the factory through the jobbing trade. This will permit closer cooperation between the jobber and the manufacturer.

The Saginaw Malleable Iron Co., Saginaw, Mich., has increased its capital stock from \$400,000 to \$650,000.



New Plant of Corcoran Manufacturing Co., Cincinnati, O.

company is erecting and equipping a new foundry plant, which will have a capacity of 20 to 25 tons of electric steel castings. The main shop is to be 86 by 250 feet.

The Luverne Automobile Co., Luverne, Minn., is offering a full line of truck unit parts for all types and sizes. The company is the manufacturer of motor fire apparatus.

The Marvel Accessories Manufacturing Co., Cleveland, O., has secured additional floor space of 15,000 square feet. The company has acquired the top floor of a four-story building.

The C. A. S. Products Co., Columbus, O., is to build a factory building 90 by 200 feet. The plant will be ready for occupancy about July 15. Additional buildings will be erected so that the production of the present plant will be quadrupled.

The Peninsular Milled Screw Co., Detroit, intends to erect a factory building on the 10 acres of land the company has acquired.

The Lewis Hall Iron Works, Detroit, manufacturers of the Hall truck, are erecting a one-story frame building 150

established itself in quarters which can be well suited to its needs. The old Knabe piano plant is to be changed over to meet the needs of automobile radiator production. The price paid was \$100,000.

The C. A. Shaier Co., Waupun, Wis., is planning to increase the size of its factory and will add to its office space. This addition will double the plant's floor space.

The Reliance Motor Truck Co. is erecting a new factory at Appleton, Wis. The first building is to cover an area of 80 by 200 feet.

The Mather Spring Co., Toledo, O., has increased its capital stock from \$300,000 to \$1,000,000.

The Stork Motor Works and the Wolverine Machine Works have merged into a new company, known as the Stork Motor Co., with a capitalization of \$75,000. The concern will manufacture, buy and sell gasoline motors and metal products and conduct a general machine and foundry business. The plant will be located in the building now occupied by the Stork Motor Works. The incorporators

PANVAR REFINISHING LACQUER.

That many automobiles are repainted when as a matter of fact full repainting is not needed at all is the assertion of H. A. Meyercord of the Panvar Co., 618 Bulletin Building, Philadelphia, Pa.

In painting a car, especially cars in the better class, some times as many as 17 separate coats of color are applied, each coat being rubbed down to perfect smoothness before the next one is applied.

Because of this fact, while it is very easy to mar the car's finish and cause it to lose its luster and pristine newness, it is really not very easy to penetrate the finish to a point where the color is exactly destroyed.

In most cases where a car has lost its "good looks," it is simply a case of the varnish luster being destroyed or impaired, according to Meyercord, and proper treatment will go a long way toward bringing this back and making the car as sightly and eye-pleasing as it was the day it left the factory. But before the average man, unskilled in the use of the paint brush to attempt the art of refinishing the body work even with the proper equipment such as the body finisher uses on automobile work, is unheard of. It simply can't be done with



Panvar Car Refinisher.

any real success. And in recognition of this fact the Panvar company have brought out under the trade name of "Panvar" a special auto body finish which possesses every virtue of the regular varnish used ordinarily for work of this sort with a few exclusive attributes of its own.

The principle trouble the lay man has in body refinishing work is to eliminate the brush marks and nothing mars the finish quite so quickly and makes the final work look amateurish as readily as brush marks. With Panvar used in place of varnish, however, there is not a chance for the car to look like a second hand machine.

The substance is made absolutely self-leveling. It eliminates all brush marks and the finish comes out smooth and wonderfully lustrous.

The second virtue of Panvar is the fact that it dries perfectly hard in eight hours. Ordinarily it is necessary to put the car in a dust proof room for a couple of days at least between each coat of paint until the final varnish has been applied. But with Panvar such is not the case. It takes its final set over night and greatly simplifies the work of refinishing. It is

a transparent liquid which can be applied to any color car with equally good success.

It can also be used for refinishing tops and redressing worn leather or imitation leather upholstery.

It is put up in cans at \$1.50 per quart and the makers will be glad to put a sample can in the hands of the Automobile Journal readers free if they will send 10 cents to cover the cost of postage.

PURITAN MACHINE CO. HAS OVER 2,000,000 PARTS IN STOCK.

The Puritan Machine Co., Detroit, Mich., has solved one of the biggest questions confronting the garage and repair man at the present time as where to obtain service parts and supplies for the some 200 different makes of orphan cars still in use, and many of the up-to-date cars.

During the past 17 years the Puritan has accumulated one of the largest stocks of automobile parts and supplies in the world through such purchases as the Cartercar, Elmore, R. C. H. and others. This enormous stock, containing over 2,000,000 parts, is at the service of all garage men, repair men and owners.

In this way the Puritan is best doing her bit in helping the government save the consumption of new raw material. Motor cars must be had and repair parts must be had for the motor cars.

The Puritan can supply parts for nearly any car regardless of year or model without the usage of new material. They do not wreck cars, all parts are brand new.

SCHWEPPE & WILT MFG. CO. ENTER MACHINE TOOL FIELD.

The Schweppe & Wilt Manufacturing Co., Detroit, Mich., well known manufacturers of automobile parts, have entered the machine tool field through the purchase of the business and a large part of the equipment of the Wilt Engineering company, which was an engineering and developing company that brought out several new types of machine tools. These tools will now be manufactured by the Schweppe & Wilt Manufacturing Co., in addition to its line of standard automobile parts products.

Believing that Detroit with its many industries using special machinery needed the addition of a machine tool industry, the Schweppe & Wilt Co. has greatly increased its floor space and has installed a complete equipment of the most modern machine tool building machinery, the capacity of which has been sold for months ahead. This company has grown rapidly and has become one of the substantial industries of Detroit. Its policy has been that of most successful companies, that of concentrating on the manufacture of one product, automobile rods, standardizing their construction, making them of the highest quality and producing them in quantity. It manufactures among other rods used in automobile chassis construction, reach rods, radius rods, torsion rods, tie rods and brake rods.

Last year the company designed for the government some of the essential units for the Liberty truck, and is now manufacturing these parts. In addition it is also manufacturing in large quantities several of the largest metal assemblies for aeroplanes. Over 50 per cent. of its capacity is now on government work.

Its plant, located on Conant avenue, on the Michigan Central inner belt line, is one of the largest type of fireproof, daylight construction, having the unique feature of glass inserts in the concrete roof, as well as glass sides. Its employees work under ideal conditions. In fact a large part of its success has been due to the loyalty of its employees, which has been gained by giving them clean, healthy surroundings. In fact working conditions of the very best kind.

NEW AUTOMOBILE SIGNAL MEETS WITH INSTANT SUCCESS.

The Liberty Siren, recently introduced by the Liberty Accessories Corporation of St. Louis, Mo., has met with the most popular demand probably ever attained by an automobile signal, considering the time it has been on the market. In St. Louis over 5000 of the signals were sold



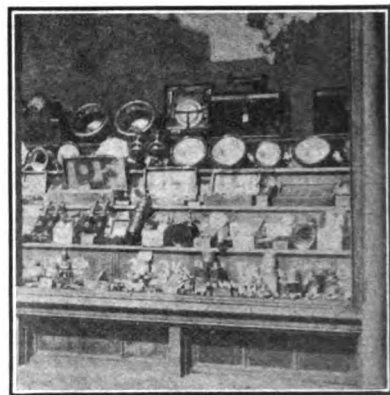
Jack Stiles, President of Liberty Accessories Corporation, Makers of Liberty Siren.

in 10 days. Its popularity is based on an exceptionally distinctive and pleasing tone, covering two octaves and giving the loud and soft tone combinations. The Liberty Siren is heavily nicked and sells for \$3.50.

Jack Stiles, a prominent figure in equipment and golf circles, who has been identified in the past with various manufacturers in the motor field, is now backing his own success and is president of the Liberty Accessories Corporation, which is manufacturing and marketing the Liberty Siren.



Accessories Department

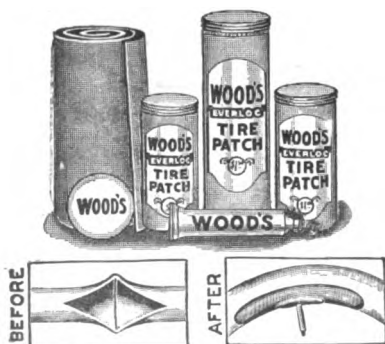


The Comer Auto-Stop Signal, an invention by Mr. G. Comer, a conductor on the Illinois Central, understanding the efficiency and positive dependency of the semaphore signal of railroad block system, conceived the idea that such a device properly operated and installed upon a motor car would solve the "safety first" problem and especially eliminate all possibility of not signaling if operated automatically. The device is attached to the tail light post or license bracket and a coil cable with strand pull cable passing through a lever attached by six screws to the floor board of the tonneau under the car, from the lever bracket a heavy strand cable is bolted to the foot brake rod by means of a lock bolt. The slightest pressure on the service foot brake takes up the slack and before the brake bands tighten up to the point of slowing the car down the red semaphore arm raises to a horizontal position, thereby immediately and automatically giving a signal to the man behind. Provision for night operation is provided by an electrical bulb (two candle power) installed within the housing of the semaphore arm and by means of a contact screw inside the axle of the semaphore when coming to a horizontal position automatically makes contact and lights, signaling the word "Stop" brilliantly illuminated to the man behind and which can be seen and read for 300 feet.

Manufactured by the Wonder Sales Co., 616 Hippodrome Bldg., Cleveland, O. Price, \$12.50.

Wood's "Everloc" makes a permanent repair on the smallest puncture or largest blow out on tubes without vulcanizing. The patch comes rolled in container, with tube of cement complete, and the makers claim a permanent job on any puncture from a nail hole to a cut or blow out 17 inches in length, which can be applied in five minutes.

Manufactured by W. C. Wood Co., 74 Western Ave., Minneapolis, Minn. The \$1.50 patch is made in sheets $6\frac{1}{2} \times 18\frac{1}{2}$ inches, \$1 patch $4\frac{1}{2} \times 18$ inches, 50 cent patch $2 \times 16\frac{1}{2}$ inches, and can be cut to any size desired. Large sheets will repair 100 one inch cuts or 250 nail punctures.

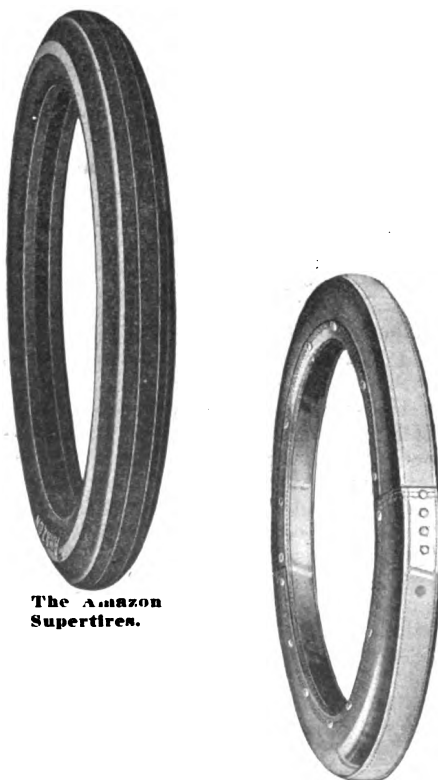


Wood's "Everloc."



The Comer Auto-Stop Signal.

New Literature on Gasoline Hose. The bureau of standards, Department of Commerce, U. S. government, in a recent report comments on the leaks in valves and piping used for conveying gasoline. Of special interest in this connection is the illustrated literature just issued, for free distribution, by Metal Hose and Tubing Co., Brooklyn, N. Y.



The Amazon Supertires.

The Allen Tire Case.

The Allen Tire Case has a patented water shed feature which the manufacturers claim make it absolutely water proof. The highest quality enamel duck is used. Its strong canvas backing and non-peeling coating make it the best possible material for the purpose. Style "1" is a regular stock cover in plain black enameled duck which harmonizes with any car. This style is also furnished in any solid color at \$1.50 additional. Style "2" is made of enameled duck or fabric leather with the body of the case to match the color of the car and the tread strips matching the trimming or running gear—or vice versa to order only. Style "3" is the latest in case styles, made in fabric leather or enameled duck to match colors of car with beading to match the trimming.

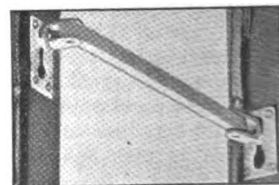
Manufactured by the Allen Auto Specialty Co., 16-24 West Sixty-First St., New York City, N. Y.

The Amazon Supertires have as outstanding features reinforcements for protection against blowouts. This is an extra fabric breaker strip built into the side walls of the tire at the place where the "traction wave" is generated and where the tire is continually flexing. The breaker strip binds the tire together, preventing the side walls from overstretching under excessive load or strain. The tread is of live, velvety rubber and has no gritty compound, this, the makers claim, is the secret of its amazing mileage—to give to stones and road obstructions, not to resist them and consequently chip, cut and crack. The tire is guaranteed for 5000 miles.

Manufactured by the Amazon Rubber Co., Akron, O. Write for prices and literature.

The Hurricane Hook is a nickeled rod $5/16$ of an inch and about six inches long. One end fastens to the door and the other end to the body holding the door open enough to let in the air, but not far enough to extend beyond the running board. Fitting flush there are no projections to tear the clothing nor rattle. When it is not in use it can be left hanging down or lifted off and stored away in the car pocket. It is adjustable to all makes of cars, is well made and mechanically correct.

Manufactured by Joseph N. Smith & Co., Detroit, Mich. Price 60 cents.



Woods Everloc.

The **Bulldog Luggage Carrier** is the most efficient and satisfactory means of taking care of the luggage while motoring. It will hold grips or suit cases of any size firmly to the running board of the car, doing away with the crowding of foot room in the tonneau. When not in use the carrier can be unfastened and carried in a pocket of the car. It is made of the most substantial material throughout and will wear for many seasons. The makers guarantee satisfaction in every case or money refunded.

Manufactured by the **Bulldog Luggage Guard Co.**, 37 Elm St., Nashua, N. H.

The **Masters Gasoline Meter** is a round device 2½ inches in diameter with a row of figures which indicate the gasoline consumption in gallons and tenths. Reading the instrument is like reading an odometer. This meter can be used on any car equipped with a vacuum feed tank and the operation is such that each cycle of operation draws in and discharges a certain amount of fuel. It is connected through a small copper tube to the vacuum tank. Every time the tank is filled and emptied an impulse is sent to the meter and these impulses are deducted into terms of gallons and tenths and indicated on the face of the meter. Floats, cords, pulleys and such devices are not used in this instrument and it is one of the most practical and simple recording devices yet invented.

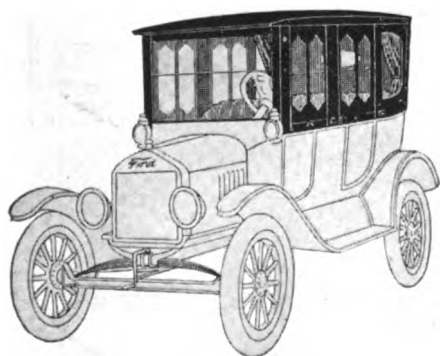
Manufactured by **Irvin W. Masters**, Muncie, Ind. Price \$8.

Treado is a prepared rubber for mending tires and rebuilding worn treads, fills small and large cuts, forming a durable rubber tread. It requires no experience to apply and dries in from 10 to 15 hours. It is also used for mending leaky rubbers, rubber boots, rubber soles and heels and will resole or repair leather and fiber soles. The cut to be repaired is first cleaned with gasoline and roughened with a knife and the Treado is spread into the opening with a knife, making a permanent repair.

Manufactured by the **Treado Manufacturing Co.**, 42 Dwight St., Springfield, Mass. Prices for tires, 50 cents a can. Leather, 50 cents a can. Rubbers, 40 cents a can.

Flexo Laminated Belts are made in sections cut from solid back belting hides— assembled with steel copper plated rivets and fastened with machine screws and nuts so that they may be readily lengthened or shortened and adjusted. These belts may be obtained in widths from ¾ to 1½ inches, and lengths as desired, endless or in rolls of 50 feet, with sufficient rivets and burrs or bolts and nuts for making them endless.

Manufactured by **Detroit Leather Works**, Detroit, Mich. Prices upon request.



The Cozy Top.



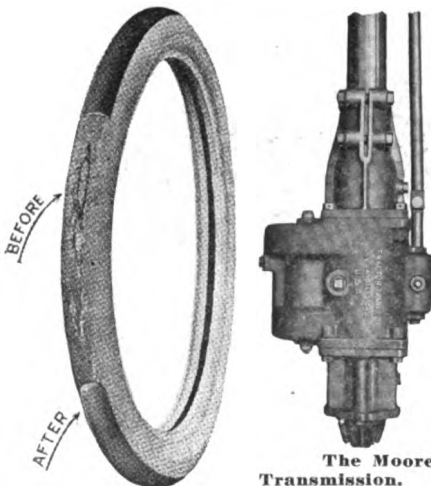
The Bulldog Luggage Carrier.



Dodge King Bolt Wrench.



The Masters Gasoline Meter.



Treado.

The Moore Transmission.

The **Dodge King Bolt Wrench** meets the long requested demand by repair men for a special wrench on King bolts and it is now manufactured in quantity so that the wrench can sell at the list of \$2.50, making the net price to the repair men so small that they cannot afford to be without one of these tools. It is made of the best steel and is light and compact, fitting the hand readily.

Manufactured by the **Walden Worcester Co., Inc.**, Worcester, Mass. Price, \$2.50.

The **Moore Transmission** is merely a matter of increased leverage; as, for instance, it is easier for a man to lift a given weight with a lever 20 feet long than it is with a lever 10 feet in length. Due to this steady flow of power the strain on the engine mechanism is very much lessened because the impulse of the engine is blended thoroughly before the power is transmitted to the back wheel.

As all parts of the transmission are properly designed and machined there is no difficulty in installing. Roller bearings are used throughout and are easily obtainable for replacement purposes and are the bearings which have been found most satisfactory for Fords. This transmission enables the driver to adapt his car to any kind of road conditions from paved streets to mud holes, deep sand and hills.

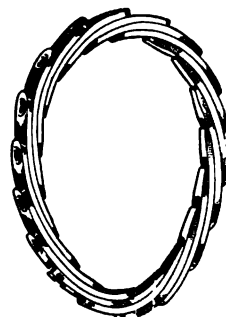
Manufactured by the **Tractor Train Co.**, 1346 Wall St., Los Angeles, Cal. Write for prices and literature.

The **Cozy Top** for Ford cars embodies the features of the "Springfield" permanent top construction. It affords all the comforts and protection provided by the coupe, sedan and limousine types of body, and it also greatly improves the appearance of the car.

The strong feature of the Cozy Top is the Hunter Automatic Curtain, which is the most ingenious and practical device invented for this purpose. It is always ready and yet never in the way. It is out of sight under the roof when one wants the car open and in one second the car can be closed without leaving the seat.

This top is carefully crated and shipped knocked down, in order to secure the lowest possible freight rates. The Roadster Top is shipped in five pieces, the Touring Top in seven pieces. It requires no special tools to put it on the car—just a hammer, a wrench, a screw driver and about one hour's time. The top is sold with a guarantee from the manufacturers of 10 days free trial and if at the end of that time it is not satisfactory it may be returned and the money, plus freight charges will be refunded.

Manufactured by **Founts & Hunter Co.**, Terre Haute, Ind. Write for prices and descriptive literature.



Flexo Laminated Belt.

The Harlan Ignition and Spark Plug Tester is a device to be attached to any internal combustion engine using high-tension ignition, from four to 12 cylinders, and designed (to test) for defects in the ignition system or the spark plugs, thereby facilitating the location of any trouble.

The tester weighs 1½ pounds and consists of a metal frame connected to the engine head, or grounded with relation to the engine on either side. In this frame is mounted three insulated rollers, which hold the terminal connections, the center roller bearing, stationary.

To test the ignition the bottom roller is turned downward, this action separating all the terminals at the same time, showing the sparks on their way to the engine plugs, thus instantly revealing the hot or weak sparks.

To test the spark plugs for high resistance the top roller is turned, bringing the resistance testing bar down. For testing for fouled or short-circuited spark plugs the contact members which extend above the frame are pushed down into contact, enabling one to locate the defective plug.

This tester can also be used as a spark intensifier.

Manufactured by the Harlan Ignition Instrument Manufacturing Co., Watsonville, Cal. Write for prices and literature.

The Hart-Bell Carbon Remover, which is easily installed upon the dash or under the hood, conveys a little water in controllable quantities to the intake manifold, where it becomes vaporized and is sucked into the cylinders with the gasoline. It is converted into steam by the heat of the explosion and allowed to act upon the carbon while the engine is running. An added feature of the device is an auxiliary air adjustment, making it possible to introduce a little air when the engine is hot into the intake manifold by merely turning the valve marked "Air," which results in a more complete combustion of gasoline, increased mileage and a smoother operating engine.

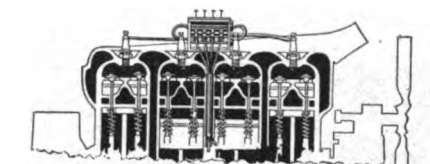
Manufactured by the Hart-Bell Co., Inc., 1926 Broadway, New York City, N. Y. Price \$6. Under the hood type, \$5.

Hercules Tops for Fords are always prepared for any kind of weather. All the materials used are carefully selected and well seasoned. The top is covered and the curtains made out of 34 ounce tan back auto rubber. Skeleton type top with natural wood bows. The rear side window is stationary and is fitted with double strength glass. The curtains above the doors roll up, working on a patented roller device and can instantly be raised or lowered. The centre metal posts on either side are attached to the Ford top irons and locked on inside of top and can be removed in about two minutes. These posts can be carried under the seats. The net weight of the touring top when crated is 200 pounds. The roadster top 140 pounds.

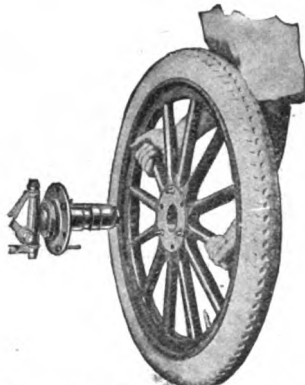
Manufactured by the Hercules Buggy Co., Evansville, Ind. Write for prices and literature.



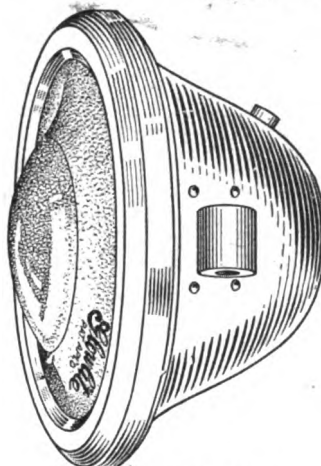
Hercules Tops for Fords.



Harlan Ignition and Spark Plug Tester.



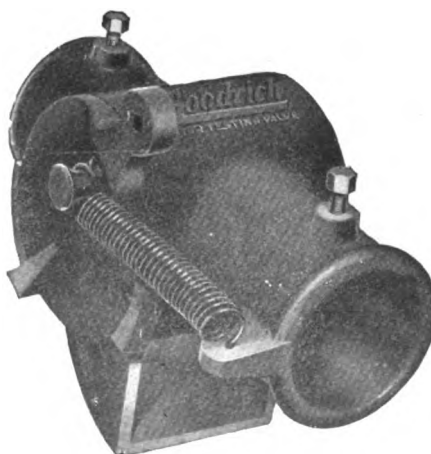
Ford Demountable Wheels and Carrier.



The Glowlite Lenses.



"Superford" Radiators.



Goodrich Motor Testing Valve.

Ford Demountable Wheels and Carrier are, the makers claim, a wonderful improvement over demountable rims. The tire change is easily and quickly made by the simple removal of three nuts and without the soiling of hands or clothing. This wheel has less weight than demountable rims and a better balance, as most of the weight is centred at the hub instead of the rim. The outfit includes an extra spare Ford wheel and an artillery type carrier, which device adds materially to the appearance of the car and is instantly available when wanted.

Manufactured by the J. P. Gorman Co., Inc., 382 Canal St., New York City, N. Y. Price, \$12.50. Write for literature.

The Glowlite Lenses, the manufacturers claim, are the highest scientific application of the safety idea in automobile headlighting. There is no concentration of light in spots or patches upon the road bed traversed. The distribution of light to the sides of the car, even almost directly at right angles to the plane of the lamps, is decidedly more uniform and more powerful than is the usual type of headlight. This is an important advantage, since it permits the driver to see ruts, rocks, ditches, etc., very clearly, as well as enabling him to read direction signs and mile posts along the road.

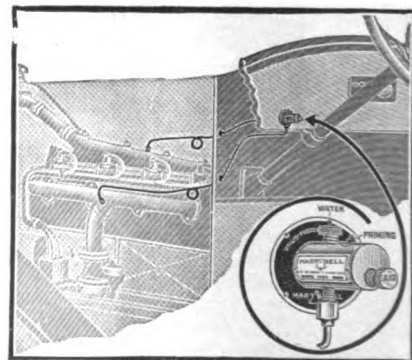
Manufactured by the Glowlite Co., Columbus, O. Price \$2 per pair, any size.

The Goodrich Motor Testing Valve replaces the old style cutout and produces a loud, clear, sharp note when the engine is running at high speed on hills. By opening the valve the gases are freely emitted, instead of being forced through the muffler. The bell mouthed opening of the valve allows for ample expansion of the gases, relieves the engine of all back pressure and greatly intensifies the sound of the explosion. Unlike other devices it has no adjustments and is easily cleaned by removing one cotter pin. It is finished in a specially prepared paint, which prevents corrosion and rust. The valve is sold complete with pedal and pulley.

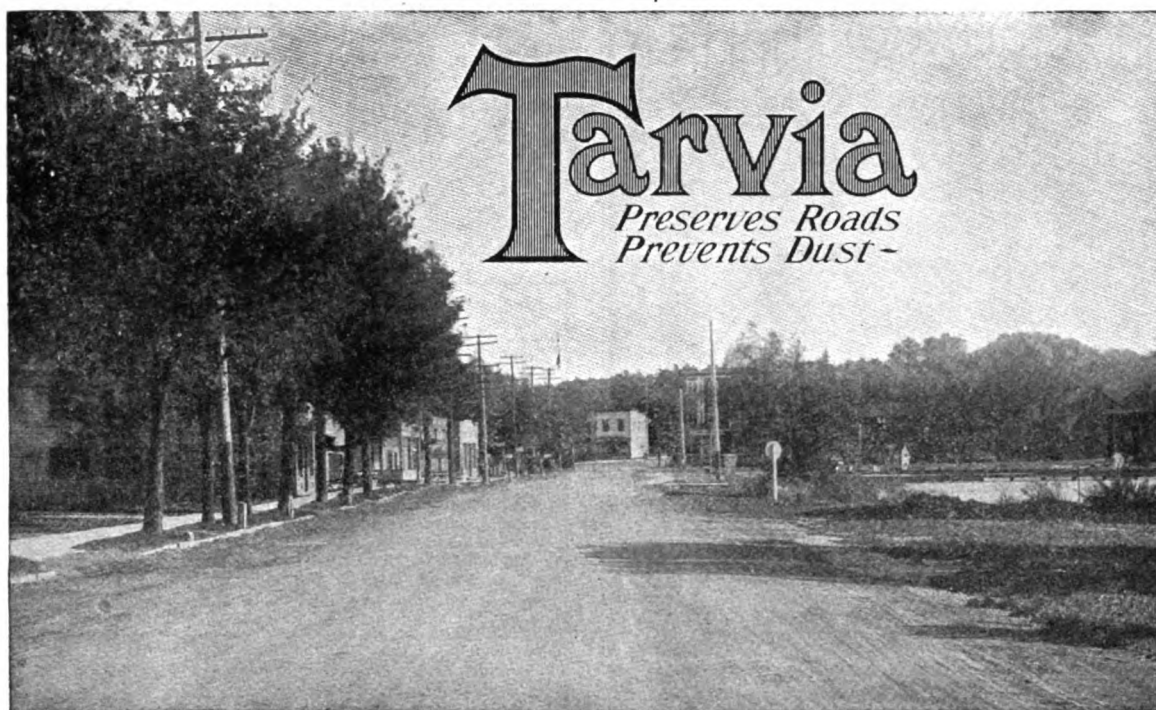
Manufactured by the Goodrich-Lenhardt Manufacturing Co., Widener Bldg., Philadelphia, Pa. Ford and all 1½ inch sizes, \$3; 1½ to 2¼ inch, \$3.75; 2¼ to 3½ inch, \$4.25. Made in ¼ inch sizes also.

"Superford" Radiators are for use on Ford cars and commercial trucks. They are made by skilled workmen and the inner units are constructed of brass and copper—no steel or sheet metal being used. The honeycomb core is of the identical type and design as used in the Packard radiator (2½ inches deep), making the efficiency of the radiator more effective in cooling than the ordinary Ford radiator. These radiators are built in two models, No. 16 "F" fitting 1912 to 1916 Ford cars and model No. 18 "F" fitting 1917-18 Ford cars. Both types are features by having detachable casings, which can be taken off at will should the occasion arise, making them a two-unit construction.

Manufactured by the Superior Lamp Manufacturing Co., 136 W. 52nd St., New York City, N. Y. No. 16 "F" price \$28, No. 18 "F" price \$30.



Hart-Bell Carbon Remover.



Main Street, Pewaukee, Waukesha County, Wis.,
maintained economically with "Tarvia-B"

Maintaining Roads At Low Cost—

Some people imagine that the smooth, dustless Tarvia roads they see all over the country must be expensive. But Tarvia roads are not expensive; in fact, *they are very low in price.*

The initial cost of a Tarvia road is but little more than that of ordinary waterbound macadam, and the saving in maintenance far more than offsets the difference in the first cost.

Tarvia is ideal for use on roads like the above. A single surface-treatment of "Tarvia-B" made this road durable, smooth, and dustless, with an easy-traction surface that will largely decrease haulage charges and greatly save wear and tear on horses, vehicles, and motor-cars.

Mr. Charles J. Hahn, County Highway Commissioner of Waukesha County, Wis., writes as follows regarding their experience with Tarvia:

"Waukesha County has been using 'Tarvia-B' for the past two years. In 1915 we used about 50,000 gallons, 1916 about 90,000 gallons, and expect to use even more this year. Would say that in 1917 we used 160,000 gallons.

"We find that it is the most economical method of maintaining our gravel and macadam roads. We find that, on account of the heavy and fast automobile-traffic upon our county roads, if they are not treated with 'Tarvia-B,' they rapidly go to pieces.

"We cordially invite any one to inspect our Tarvia-treated roads."

Send for illustrated booklet showing towns all over the country that are using Tarvia successfully.

Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems.

The advice of these men may be had for the asking by any one interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will have prompt attention.

New York Chicago Philadelphia
Cleveland Cincinnati Pittsburgh
Kansas City Minneapolis Nashville
THE BARRETT COMPANY Limited:

The **Barrett** Company

Boston
Detroit
Salt Lake City
St. John, N. B.

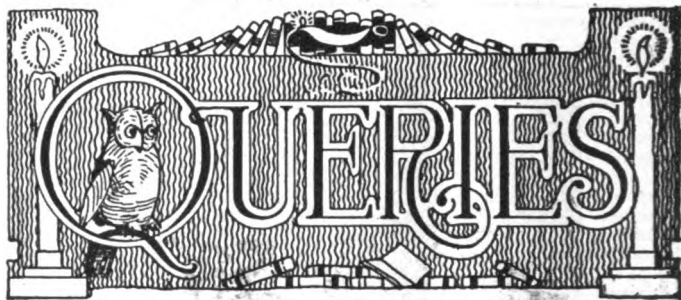
St. Louis
Birmingham
Seattle Peoria
Halifax, N. S.

TRADE MARK
B
Sydney, N. S.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

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NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW DO YOU CARE FOR THE STORAGE BATTERY AND KEEP IT IN GOOD WORKING CONDITION?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the issue in which the question appears. Answers to the question should be in the hands of the editors by the 5th of August. The contest is open to every one.

HOW DO YOU TAKE CARE OF THE BRAKES ON YOUR CAR AND WHAT METHODS DO YOU USE TO KEEP THEM IN CONDITION?

(R. L. Prindle, N. Abington, Mass.)

(Best Letter.)

There are two sets of brakes employed today on the motor car, which are commonly known as the internal expanding and the external contracting type, operating in nearly every case on the rear wheels. It is needless to say that the brakes are one of the most important parts of the car and for this reason great care should be used in their inspection and adjustment to insure the highest degree of safety. The brakes must be effective and dependable and capable of locking both wheels with the hand lever or foot pedal if necessary, and it is to be remembered that this is done only in case of emergency, as disaster is very apt to result to the car itself where this practise is continued in and serious damage to tires and tubes.

A brake should be adjusted so as to be entirely free from the drum when not in use, as dragging will cause heating, unnecessary wear and a loss of power. At the end of a run one may determine if any dragging is taking place by placing the hand on the drum, and if hot the remedy is to allow more clearance.

Too much care cannot be used in not only inspecting the braking surfaces themselves, but also the various rods, pins, bolts, joints, etc. Where many cotter pins are used in the braking system, which is often the case on many cars, these should come in for a close examination and if any are removed for any reason new ones should be put in their place.

Since the foot brake is used so much more than the emergency, it is naturally subject to more wear and tear and, of course, will require frequent adjustment and replacements, such as new lining.

A good driver uses the brakes but little, and when used are applied lightly at intervals until the momentum is overcome and the car brought to rest. When on a level road one may coast to where it is desired to stop without using the brakes at all and may be accomplished by anyone with a little practise and the expense of upkeep is greatly reduced.

Remove both rear wheels from the floor by the use of wood blocks, with the gears in neutral engage the hand lever a few notches, then turn each rear wheel by hand and compare the resistance offered. If one turns too easy or too hard make the necessary adjustments until the desired results are obtained.

The foot brake is tested by using a jack to bring pressure on the pedal by operating the jack until the wheels are turned with equal resistance with the hands.

The engine may be used as a brake on hills and made more effective by switching off ignition or shifting to a lower gear. Care should be taken if the car is moving very fast to reduce the speed in order that the gears may mesh without harsh clashing, due to the great difference in engine revolutions and car speed.

Where the brakes are used alone in the descent a very good plan is to alternate the foot and hand lever for a time, as this equalizes wear. When the hand brake is used apply with caution, as there is danger of brake rods being broken. If the brake is set hard it cannot give when the car passes over water bars, etc. At this time the rear axle moves backward, owing to the flattening of the springs, and if the brake rods happen to be tight the strain falls on them, stretching or breaking some part. While using the foot brake the foot automatically yields to the strain.

It sometimes happens one brake rod passes through a tube carrying the other and they may become stuck or frozen if not properly oiled. Be sure the grease cups are given one turn a day. If they do become seized remove the lower part of the grease cup and force kerosene into the hole with an oil gun, working the brakes meanwhile to free them.

Look over the equalizers if any are provided and adjust rods to the same length to insure good action.

With all brakes properly adjusted, lining in good condition, pins in place and joints properly oiled, they will do all they are called upon and perform quickly and positively.

(A. M. Nielsen, Georgetown, Ontario, Canada.)

(Second Best Letter.)

I note in the last issue, June 10, that the subject of brakes and their care is open to suggestions and I herewith send you my ideas regarding them.

Next to a smooth running engine the care and condition of the brakes come next in importance. In fact they should be placed first of all, because if they are out of order and your car is in motion they are as useless to one as the lines loose on a pair of runaway horses. All I need to say in proof of this is look to the long list of accidents that occur yearly, due to improper conditions of the brakes, to say nothing of the many fenders, headlights and radiators that become damaged or broken.

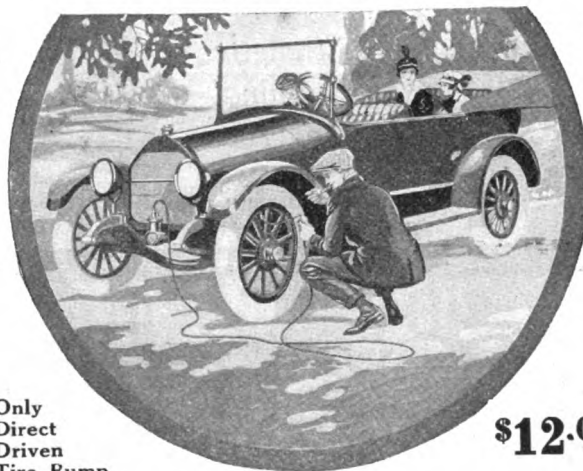
To avoid all such accidents owners of motor cars should inspect and test their brakes every two weeks, if brakes are used continually, as in city traffic, otherwise a monthly inspection is sufficient if given proper usage.

To adjust the brakes properly, jack up both rear wheels and remove them if a thorough inspection is to be made. See that there are no broken or weak springs. See that the brake bands are in good condition and that oil or grease is not or cannot get on them. See that the bands are not bent out of shape and that they do not rub against the frame; see that the grease cups are working properly and put a few drops of lubricant on all moveable joints, meanwhile looking for excessive wear, which will soon cause rattles if left unnoticed. Before replacing wheels notice if bands are worn even and if not, bend or adjust them so that they will be. If there is oil or grease upon them a little fuller's earth will soon eradicate the trouble. After replacing wheels the following is practically the only adjustments and tests needed to make monthly: Apply the emergency brake lightly and then try to turn one of the hind wheels by hand, then the other; if both turn freely, shorten the brake rods until the

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brake just takes effect. Adjust both evenly. This feature is very important. Now apply the brakes hard, try both wheels and see if they offer the same amount of resistance. If not, again adjust the rods. The wheels should lock. Have some one operate the service brake and adjust it the same as the emergency. Many people prefer to have the emergency to lock when it is applied hard, backing it with the argument that standing on hills, etc., is good policy; granted, but one should be careful in applying them so that the tires won't skid. It is poor policy to drag the wheels going down long hills. Throw your car into a lower gear and retard spark. Retarding spark, if engine has good compression, should suffice upon small grades.

One well known manufacturer of brake linings states that engineers have proven that when brake mechanism is rightly adjusted and the road average, any car should stop at distance indicated in chart below:

Speed of Car	Car Should Stop In
10 miles per hour.....	9.2 feet
15 miles per hour.....	20.8 feet
20 miles per hour.....	37.0 feet
25 miles per hour.....	58.0 feet
30 miles per hour.....	83.3 feet
35 miles per hour.....	104.0 feet
40 miles per hour.....	148.0 feet
50 miles per hour.....	231.0 feet

Now try this test on your car and I venture to say that the results will surprise you.

TROUBLE IN INDICATOR.

(M. H. A., West Lynn, Mass.)

I have recently purchased a used Dodge car and as I have received valuable information from you in the past, I am writing to request information on a peculiar condition which exists in this car.

There is on the instrument board an indicator which shows three positions relative to the conditions of the battery. These three positions, as you probably know, are "Charge," "Discharge" and "Off." There are times when this will indicate correctly, that is when the engine is running and no energy is being taken from the battery, the indicator will swing to the "Charge" position. If under these conditions the engine is stopped and the lights are lighted the indicator will swing to the "Discharge" position. On the other hand, there are times when the indicator will work just the opposite from what it should, that is with the engine running and no energy being taken from the battery it will indicate "Discharge" instead of "Charge," and if under these conditions the engine is stopped and the lights switched on the indicator will swing to "Charge." Under either condition with the engine stopped and the lights off the indicator will swing to the position of "Off." The battery tests O. K. regardless of either condition and an electrician informs me that regardless of the position of the indicator the battery would charge when the engine was in operation whether the indicator registered "Charge" or "Discharge," but at the same time I would be interested to know why at times the indicator will work correctly and at other times work exactly opposite from what it should.

Please advise me where I shall look for this trouble in order to correct same.

The current indicator is inserted in the changing circuit between the reverse current cut-out and the positive battery connection of the starting switch. To the positive terminal on the current indicator are connected the wires which conduct the current for the ignition and lighting switch and for the horn. This indicator registers "Charge" when the starter generator is charging the battery, and "Discharge" when the battery is supplying current for the ignition or lighting systems. Whenever the starter-generator is supplying normal current to the battery, however, the indicator will show "Charge" even if all the lights are burning. "Discharge" will appear on the indicator whenever the lights are being used while the car is standing or running on direct drive at a speed of less than nine to 10 miles per hour. If at any time the current indicator fails to register properly, inspect its terminal posts to see that the wires thereto are tightly at-

rached. Make sure also that there are no short circuits in the wiring system. The showing of "Discharge" instead of "Charge" when the latter should be indicated is an almost certain sign that a short circuit has developed in the wiring, unless, of course, the wires attached to the current indicator have been connected to its terminals in such a manner as to reverse the direction of the flow of the current through the indicator. If these directions do not overcome your difficulties remove the current indicator and inspect it for internal difficulties. Should the current indicator be removed from the circuit, connect together all the leads which are normally attached to its terminals. Failure to do this will injure the equipment if the engine is started.

EXCESS OIL IN OAKLAND "32."

(S. G., Flint, Mich.)

Can you tell me what I can do to stop my Oakland model "32" from pumping oil through the pistons. I have ground the valves about three times and put new rings on the pistons, but only one ring on each piston and it doesn't seem to do any good.

Many drivers carry the oil level in their engine too high. As a result the oil splashes from the reservoir and whatever adjustments are made to remedy this defect are useless under these conditions.

The following method is suggested for checking up the oiling system. Drain and remove the oil from the base of the engine. Fill the removed base until the oil just runs out of the oil level indicator. Measure the distance from the bottom of the oil trough to the upper surface of the oil in the reservoir. This should be $\frac{3}{4}$ of an inch. If it is less than this amount remove the oil level indicator and secure it to the base at the correct level.

Another cause of over-oiling is that the holes in the six oil tubes point so that they throw the oil directly onto the cranks instead of into the oil troughs. See if this is the case, and if so loosen the solder holding the tube to the case and point the openings so that the oil is thrown down into the troughs. Also try a heavier body of lubricant.

If the above remedies fail to remedy the trouble, proceed as follows: Drill a hole $\frac{3}{4}$ of an inch in the side of the oil trough, one inch down on the side that the crank dipper strikes first when the engine is running. These holes will act as a return for the excess oil and allow it to run back to the reservoir. In exceptionally obstinate cases additional holes may be drilled between each of the holes already in the pistons, or the holes already there may be broached out, thus making them larger, which would have the same effect as the additional holes. If these methods fail to remedy the trouble the cylinders must be reground and new piston lapped in.

TUNING UP E. M. F.

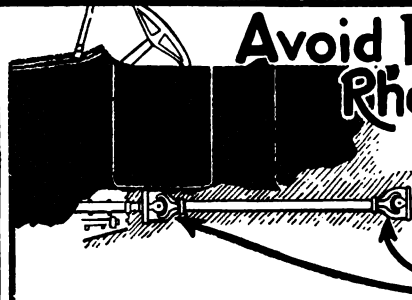
(R. L. P., N. Abington, Mass.)

Will you kindly give me special directions to adjust the steering gear on a 1912 "E. M. F." (30) touring car. There is play in the steering wheel of four inches in both directions. I can take care of the looseness very well in the tie rods. Also what attention should be given a Splittorf magneto. I am tuning up this car and have but a few days more to complete the work. Another fault with this car is the gear shift lever slipping out of high speed frequently. What should be done here? I am enclosing 25 cents silver for another copy of the May 25th Overhaul Number of the Automobile Journal.

Your question of June 18th relative to steering gear adjustment, is taken up in the General Chassis Overhaul story which is published in the June 25th issue of the Automobile Journal.

Look at the Splittorf magneto's platinum points. If these contacts have become pitted so that bad contact results, they can be filed flat with a fine file, care being taken not to file off more than is necessary. Then reset the screw so that the break is no more than a thick piece of tin, say $\frac{1}{32}$ of an inch. Don't lessen the efficiency of the magneto by the use of imitation platinum points. Don't disconnect the wires leading from the magneto to the coil unless you are careful to get them back into their proper places. Crossed wires mean burnt out connections. Don't pull out the carbon brushes in

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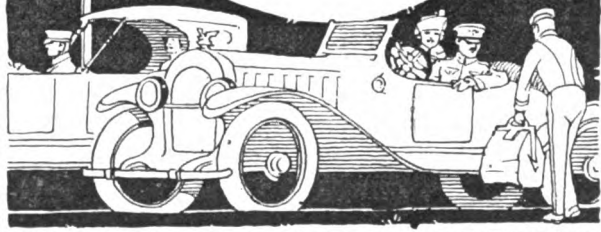
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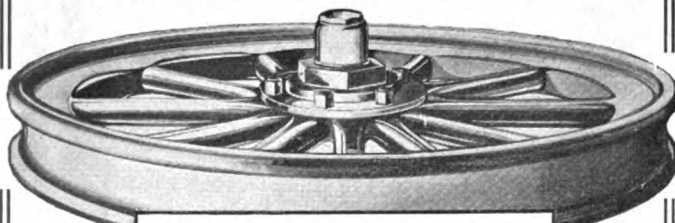
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Established 1827



the distributor because you think there is not enough tension on the springs. Don't fail to put back your wire gauze brushes in the breaker box when putting it back on the magneto. Do not smash them over. Do not put too much oil in the oiler holes. A drop is sufficient.

The shift lever slipping out of high gear is probably due to a worn collar. This defect may be dressed or squared by grinding.

TIMING GEARS OF E. M. F.

(R. L. P., N. Abington, Mass.)

What provision is made for oiling the timing gears on the E. M. F. "30." Is it automatic?

The timing gear case is filled with a heavy engine oil, inserted through a plug at the top of the case, and it should be refilled occasionally according to the number of miles the car has been run.

LEAK PROOF PISTON RINGS.

(W. A., Worcester, Mass.)

I have just purchased eight new leak proof piston rings for my engine, which has been leaking oil past the pistons. Would you advise me to bevel the pistons where the lower ring is? What is the reason for an engine knocking?

After the installation of the new rings you may find that the oil trouble is eliminated, and after removing the carbon deposits caused by the excessive oil the knock will probably disappear also. Suggest that you try the new rings before beveling and boring holes in the pistons. If after you have tried them out and the trouble is still evident, proceed as follows:

File or turn a slight bevel around the shoulder at the lower edge of the lowest ring above the wrist pin and if there is a ring below the wrist pin, treat it similarly. The face of this bevel should not be over 1/16 of an inch. Bore a series of holes about one inch apart and 1/16 of an inch in diameter around the circumference of the piston along the bevel, through the piston wall to the inside. If there is a pin holding the ring in place on the outside do not drill a hole so near as to allow the pin to fall out. This method will allow the oil, which is scraped from the cylinder wall by the stroke of the piston, to flow back to the crank case through the holes.

Excessive oil leakage into the explosion chamber may be traced to a number of things. Perhaps the cylinder walls are scored. It may be that the piston is not large enough to properly fill the cylinder. You may find that a heavier grade of oil will overcome this difficulty.

You mention the engine knocking. It is probable that the knock is caused by excessive carbon deposit in the cylinders, which is in turn caused by excessive oil supply in the explosion chamber. A loose cylinder or cylinder head will cause a knock. A loose connecting rod or main bearing on the crankshaft will have the same effect. A loose flywheel is very hard to locate. If the spark is advanced too far a knock will be heard. A rich mixture will often produce a knock.

ADJUSTING EMERGENCY BRAKE.

(H. H. B., Philadelphia, Pa.)

Will you kindly advise me, a subscriber, regarding my Maxwell car?

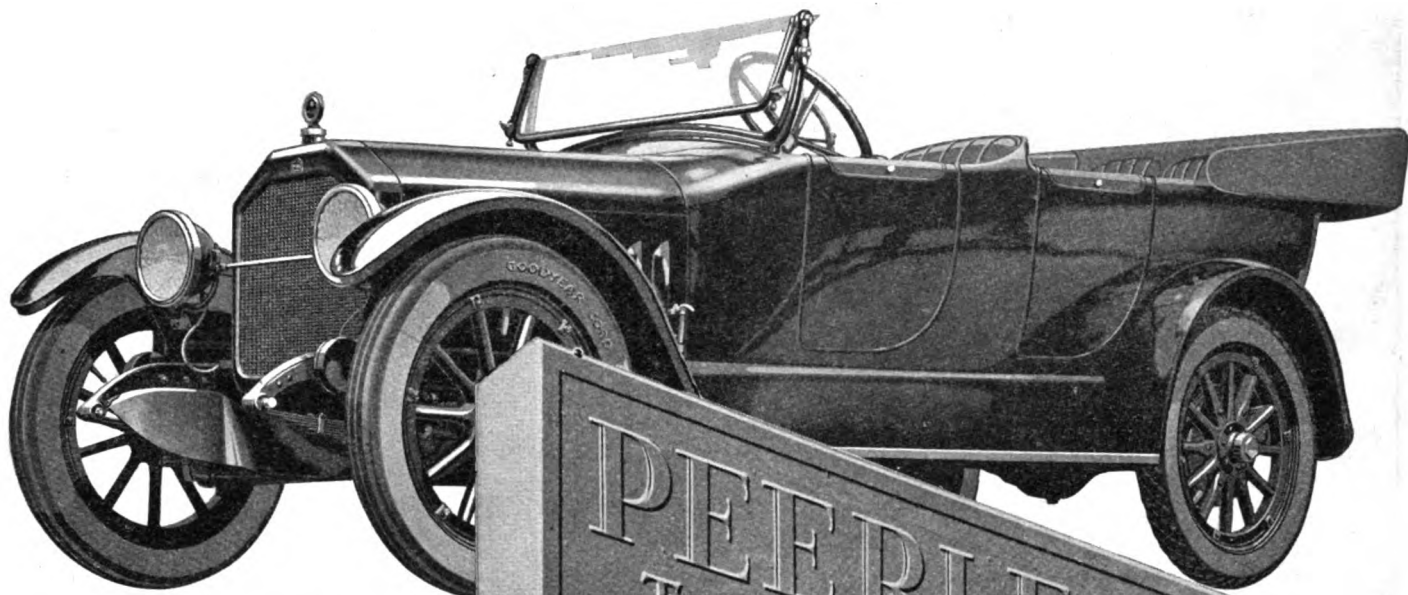
My emergency brake fails to hold on grades. I have had it taken apart at a garage and an attempt made to adjust and overcome the trouble, but with no favorable result as far as I can discover. Will it be all right to put in between drum and band the wafers advertised for that purpose? What brand and where can I procure the wafers?

We would advise removing the rear wheels and a thorough examination of the brake lining. If it should be worn, replace it with new. If it is not worn and the brake adjustments pulled up to their full extent, the wafers that you suggest should be inserted. These wafers may be obtained from the Armiger Chemical Co., 2155-57 Austin avenue, Chicago, Ill.

Naturally on an old model car such as yours the metal surfaces have become worn, thus making necessary a means for filling the clearance left between the braking surfaces.

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A demonstration shows the prospective buyer that for every-day utility-driving he may use a trickle of power in a soft, smooth, even flow and operate with no more expense than if he had no big reserve of power and speed.

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The Peerless Motor Car Co.

Cleveland, Ohio.

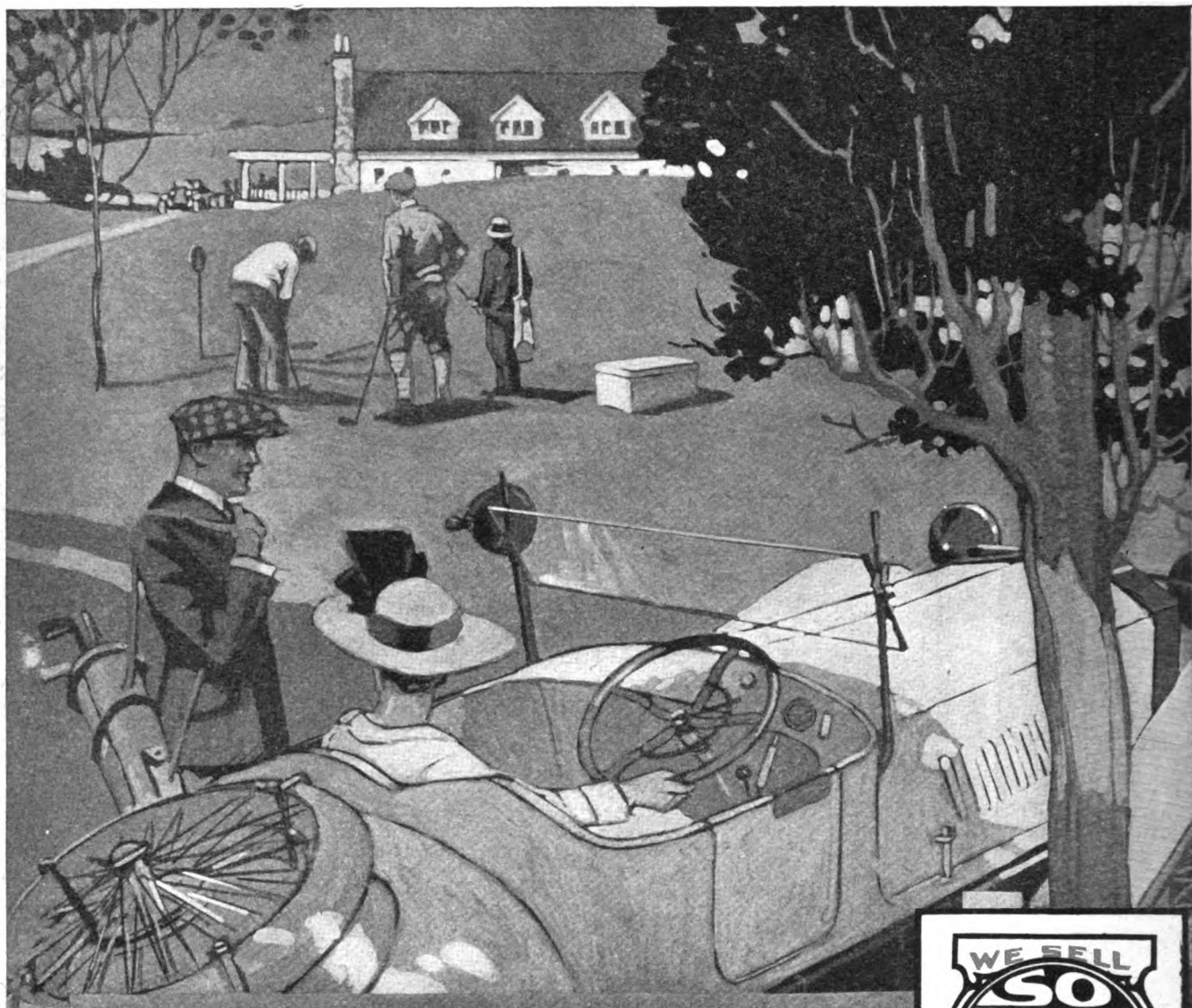
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In this range the performance is notable for its soft, smooth agility and all absence of apparent effort.

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VOL. LXV.

PAWTUCKET, R. I., JULY 25, 1918.

NO. 11



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AUTOMOBILE JOURNAL

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32x3½...\$4.85	35x4½... \$9.00
31x4 ...\$6.00	36x4½... \$9.00
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Size	Tires	Size	Tires
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30x3	.. 3.00 up	35x4 1/2	.. 8.00 up
30x3 1/2	.. 3.75 up	36x4	.. 7.75 up
31x4	.. 5.00 up	36x4 1/2	.. 8.00 up
32x2 1/2	.. 5.00 up	37x4 1/2	.. 8.00 up
32x4	.. 6.50 up	35x5	.. 8.50 up
33x4	.. 6.50 up	36x5	.. 9.00 up
34x4	.. 6.50 up	37x5	.. 9.00 up

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\$10. up**

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Made to sell for \$8. Is complete with hose and pressure gauge.

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We carry the largest and most complete stock in New England.

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ANNOUNCEMENT TO SUBSCRIBERS

Beginning with August, the Automobile Journal will issue monthly instead of semi-monthly. The change is necessary to comply with the conservation policy of the government as applied to both materials and labor, there being constantly increasing shortages of both, with no lessening of demand unless instituted by the publisher.

The purpose of the Automobile Journal Publishing Co. is to co-operate with the government to the fullest extent. Patriotism is first in business as well as in public, private or civic life.

In making the change from semi-monthly to monthly the Automobile Journal is also conforming with the tendency of the times, on which publishers are generally agreed,—that practically and ideally the best interests of publisher and subscribers are served.

The readers of the Automobile Journal will benefit in that they will have in each issue a greater number of pages, the character of the contents will be strengthened and improved, and both in editorial quality and volume the value of the publication will be decidedly enhanced. The main object of the publisher has been to afford subscribers the largest measure of satisfaction, and the announced decision was reached only after their interests had been given full consideration, and provision made to give them a better magazine than had ever before been produced.

Automobile Journal Publishing Company

NEW YORK

CHICAGO

CLEVELAND

BOSTON

DETROIT

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AUTOMOBILE JOURNAL

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Ten Cents
a Copy

VOL. LXV.

JULY 25, 1918.

NO. 12.

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Treasurer . . WILLIAM H. BLACK

Secretary . . . D. O. BLACK, JR.

AUTOMOBILE JOURNAL PUB. CO.

Times Building, Pawtucket, R. I.

THE AUTOMOBILE JOURNAL, which has been a semi-monthly publication since it was started over 12 years ago, will become a monthly publication beginning with August. This change has been made to meet the exigencies of the times which have developed through war conditions, alterations in trade and business methods and the imperative demand for conservation of labor and materials from the government.

With the shortage of material and labor for development work in the motor car industry and its various dependent lines, there are so few radically new ideas or products introduced that the situation no longer even warrants the publication of a semi-monthly journal devoted to the industry, trade and users, as the complete field can be thoroughly covered and to better advantage by a monthly publication.

The Automobile Journal, which has enjoyed a wonderful prestige and patronage throughout many years, will, through this change become an even more complete and elaborate record of all the interesting and latest happenings in motordom, and will elicit the esteem of its readers in greater measure than the past. This improvement is the natural consequence of the concentrated effort and gain in time that will result and make possible the survey of the field with greater exactness and the collection of data and information to better advantage.

Through the economy in paper effected the issue of a larger publication is also permitted, which fact has influenced the publishers in their change of plan, while at the same time giving full consideration to the subscriber's interests.

ANY idea that the automobile was to escape taxation, was dispelled with the announcement by the Ways and Means Committee of Congress, containing proposals for incorporation in the new revenue bill by which it is hoped to raise \$8,000,000,000. The committee recommends that manufacturers pay a tax of 10 per cent. on gross sales of all passenger cars; five per cent. on gross sales of trucks; that owners pay a tax which is levied on a rising scale with a minimum of \$10 a car and that a tax be imposed on gasoline of two cents a gallon, payable by the producers.

The fair minded motorist will accept this decision of the government if it becomes law, as it is simply another contribution on his part toward winning the war and the war must and will be won at any cost.

Congress aims at a fair and even distribution of taxation, and while at times it seems that certain classes were being singled out for more than their share of contributions, the man in a position to pay any tax should not strongly object and would not if he considered the many advantages he is enjoying as a native of this country.

When thousands of our countrymen are giving their lives to the cause any business man should be thankful to keep even during the period of the war, as after it is over, unless all precedents are shattered, the country will enjoy its greatest prosperity and it still retains all the necessary raw materials and labor to produce this prosperity, while the European countries are less fortunate in this respect, having suffered a great depletion of both. These people have also been deprived of the use of their automobiles.

THE AUTOMOBILE JOURNAL

VOL. LXV.

PAWTUCKET, R. I., JULY 25, 1918.

NO. 12.

Record Membership Campaign For N. A. D. A. In New England

Nearly Five Hundred New Members Result From Campaign Which Ended With Rousing Convention. Patriotic Aims and Business Objects Strongly Endorsed.

Dealers See New Era in Business.

THERE was never so successful an organization campaign in the history of the automobile trade as that which was conducted to increase the membership in the National Automobile Dealers' Association among New England dealers and the wholehearted enthusiasm which accompanied the movement was a most powerful and sincere testimonial to the objects of the association, as nearly 500 of the leading automobile distributors were enrolled.

The campaign wound up with a rousing meeting at the Hotel Brunswick in Boston on July 26, which was attended by dealers from all the New England states and President F. W. A. Vesper of St. Louis and Executive Secretary E. E.

directors. The others on the committee were: Joseph S. Donovan, Studebaker; R. B. Nettleton, Chandler; J. J. McGregor, Oldsmobile; F. W. Stockbridge, Winton; J. M. Linscott, Reo and Republic; A. L. Danforth, Cadillac, and L. B. Sanders, Oakland.

Work was immediately started and meetings were held in Boston every day and members of the committee went to Portland, Me., Providence, R. I., Springfield, Mass., and other cities, meeting with success on every trip. When the committee opened its campaign there were about 85 members of the N. A. D. A.



President F. W. A. Vesper of St. Louis.

When President Vesper and Executive Secretary Peake arrived in the city their expectations were more than realized by the progress already accomplished before the convention was held and later during the course of his speech the latter stated that he must admit that the New Englanders were not as much asleep as the westerners were prone to consider them, but on the other hand they had set a pace which if followed elsewhere would assure a success of the organization even greater than had been hoped for.

Several weeks ago when it was announced that a drive would be made in New England to increase the membership of the N. A. D. A., the New England division of the organization took on its official form in the appointment of a committee headed by John H. Johnson of Boston, who is one of the national



Executive Secretary E. E. Peake of Kansas City.

in New England, of which number 50 were Boston dealers. Chairman Johnson at the convention announced that there were 343 new members, making a total of 428 in the New England division. By noon on the following day additional



Vice President J. H. MacAlman of Boston.

Peake of Kansas City explained the conditions in the trade that had brought about the creation of the N. A. D. A. and its patriotic objects in securing conservation of labor, supplies and materials to aid in winning the war.

N. A. D. A. Gets Big Boost In New England

memberships brought the total to 444, and later the number had exceeded 450.

John H. Johnson of Boston, chairman of the New England committee, presided and introduced the speakers after making a few brief remarks on the objects of the meeting, during the course of which he mentioned the vital need of organization, as other merchants so organized received recognition, while in the past the automobile dealer had been looked upon as sort of a peddler.

President Vesper as his first subject treated with the injury that had been done to the business by dealers who referred to the business as a "game" and stated that it was unfortunate that they had created the impression broadcast that this was their attitude toward the business, this being the basis of the whole trouble at present, as officials at Washington and the public considered it a game. He also spoke of the early advertising mistakes in the business and said that many things had been allowed to creep in which, while not appearing injurious at the time, had wrought considerable injury and loss of profit. He stated that the business was without a precedent, which fact made it impossible to compare it with any other. He said that the first time the dealers were recognized was at a meeting of the steel curtailment committee and that previously questions affecting the business of distributing automobiles was settled for the dealer and that he was not really taken into consideration, most of the dealings having been with the factory. The real decision against extensive curtailment of car production came, was the belief expressed by Mr. Vesper, when the statistical information concerning the business was submitted, showing its enormous ramifications. These figures showed that there were approximately 28,000 dealers in the country, with a business investment of \$288,000,000 and an annual expenditure of \$184,000,000 in salaries, wages, etc., and dependents totaling 230,000 who are employed in garages, or by dealers and distributors. Ranking as the third largest merchandising business in the country, being exceeded only by that of steel and clothing, respectively, he pointed out that the dealers should demand that the business be recognized and should object to its being made a mark.

He pointed out the work of the automobile and internal combustion engine in winning the war as an answer to those who doubted the utility of the motor car.

In carrying out the various conservation objects which is a principal purpose of the N. A. D. A., Mr. Vesper called attention to the fact that in effecting these reforms a lot of unnecessary overhead, unessential to the business would be taken away, and in connection with which he mentioned the abuses of the service systems that were employed across the country. The opening of garages, dealers' service stations,

supply stores and gasoline stations on Sundays he said was absolutely for the purpose of enabling automobile owners to use their machines for fun and explained how the dealers in St. Louis had established a central service station which took care of the absolutely necessary work on Sundays, but which did not sell supplies and parts.

That these changes in the methods of conducting the business would not only put it on a legitimate basis, but would be a practical demonstration of the dealers' sincere intention of curtailing the use of the automobile for pleasure, was his declaration.

That there was a means open of meeting all the curtailment necessary in the use of gasoline without in any way interfering with the demands of the government was shown by figures quoted by Mr. Vesper on gasoline wastage, which could be prevented. He said the tank wagon losses through drippings was 7200 gallons a day; garage wastage 108,000 gallons a day, leaky and poorly adjusted carburetors 271,400 gallons a day, and idling motors 150,000 gallons a day.

In conclusion he stated that the organization was growing in membership at the rate of 500 to 600 a week and that a large majority membership was assured.

Mr. Peake paid a high tribute to the New England committee that had been so successful in its campaign and stated that through their efforts the New England division had accomplished more for the N. A. D. A. than any other section up to the present time. He also spoke of the beneficial effects this would have on the dealers throughout the country for the good of the organization.

In opening Mr. Peake reviewed the business, stated that many had met with failure through lack of organization and because they had tried to solve problems by themselves instead of finding out the true status of conditions from men in the same business who had more experience. He stated that the cooperation resulting through the organization would lead to the elimination of many of these causes of failure and would make it possible to eliminate many things that the dealers have been doing which they could not afford.

The N. A. D. A. in addition to its patriotic objects would be a great clearing house of ideas for automobile dealers for the purpose of rebuilding and repairing the business on a proper foundation and to eliminate the unsound and unbusinesslike practices that had crept into it. He pointed out that business should not be so founded or conducted that it can only continue under auspicious circumstances, but should be so regulated that when developments arose of an unfavorable nature, it would weather the storm.

A publicity department and headquarters in the hands of capable men to educate the public as to the true guise of the automobile; uniform theft laws

throughout the country; uniform license laws were mentioned as objectives for which the N. A. D. A. would also work.

FRANCIS E. STANLEY KILLED UNDER AUTOMOBILE.

Famous Inventor and Car Manufacturer Met Death in Accident While Driving at Ipswich, Mass.

Francis E. Stanley, the famous inventor and manufacturer of steam automobiles, was killed at Ipswich, Mass., on July 31 when the automobile he was driving turned turtle. He was pinned under the car and his chest crushed so badly that he did not regain consciousness, dying while on the way to a hospital.

He was one of the pioneers in the automobile industry and for 20 years one of the few manufacturers of steam propelled cars, his product, the Stanley steamer, having established a world wide reputation in the early days of motor car racing.

Mr. Stanley was born in Kingfield, Me., and spent his boyhood on the farm and was educated to be a teacher, which occupation he followed for a number of years. Later he opened a photographic studio with his brother, Freeland O. Stanley, at Lewiston, Me. The Stanley brothers developed the dry plate, which was universally known under their name. This business grew to such enormous proportions that they moved their factory to Newton, Mass., where the Stanley car was later manufactured and where the Stanley brothers made their residence ever since. They manufactured the Stanley plates at Newton until the sale of the business to the Eastman Kodak Co. of Rochester, N. Y., about 15 years ago.

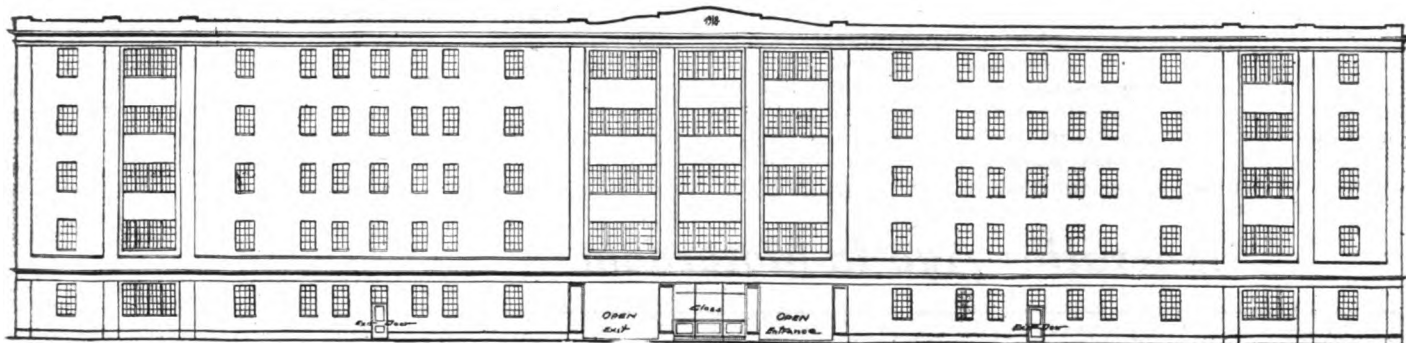
In 1897 Mr. Stanley became interested in self-propelled vehicles and in that year built the first Stanley steamer. He sold the patent and manufacturer's rights on his car and retired from the business for a year. When the business was resumed Mr. Stanley was its active head up to June, 1917, when he resigned and his son-in-law, Prescott Warren, was elected to the position.

Mr. Stanley was a remarkable man aside from his inventive genius. When the internal combustion engine invaded the field and it seemed would swamp all other types of motive power for propelling vehicles, Mr. Stanley continued the manufacture of his steam car, making improvements from time to time and selling his entire output with little difficulty.

He was one of the leaders in the promotion of automobile races in this country and he with his brother built the first car that exceeded a speed of two miles a minute. For many years the Stanley car held numerous track records and the record of a mile in 00:28.5 at Ormond Beach, Fla., in 1906, stood for many years.

Largest Garage in the World in New York

Accommodations for 863 Cars, 200 Rooms for Chauffeurs—Cars Driven From Floor to Floor Over Inclined Driveways—To Be Controlled by a Number of New York Hotels



Front Elevation of Interstate Garage, Which Will Have Testing Track on Roof.

THE largest, most complete and finest garage in the world is being undertaken by the principal hotel men of New York City for the benefit and protection of their patrons and guests, and it is now under construction. It will be opened for the reception of 500 cars by Sept. 15 to 20, and it will be entirely completed by Nov. 20. Over half of the accommodations were engaged before work was started on the construction of the building. The project of this garage, for it is an interstate undertaking, has been in course of the perfection for nearly a year.

The garage is being erected on the block bounded by 47th and 48th streets and Second avenue, with a 200-foot frontage on Second avenue and extending 350 feet on the street sides, which embraces the old Claussen brewery property and the additional buildings they control. The Interstate Garages, Inc., was incorporated under the laws of the State of Delaware for the construction of garages throughout the various cities of the United States, and will combine every modern utility for the proper care and protection of cars and the elimination of inconveniences and bad features.

Each car will have a commodious steel cage, size 20 by 12, and even larger when required for larger cars. They will be thief proof and fireproof and equipped with every conceivable improvement, including owners' and chauffeurs' steel thief proof lockers, stand pipes for washing, facilities for polishing with said private cage, work bench, flushing devices, smothering devices for fire and telescopic doors to each cage.

There will be no elevators, except an emergency and passenger elevator, and there will be no delays in getting in and out as the cars will proceed by slightly inclined, wide runway double ramps for entrance and exit on their own power to their private garage. All progress of entrance and exit will be right hand rotary, thereby rendering collision or injury to cars impossible. Thirty-six cars can be served with gasoline and commodities simultaneously.

The aisles throughout the garage will be 20 feet wide, the runways or ramps the same width, with raised concrete dividers.

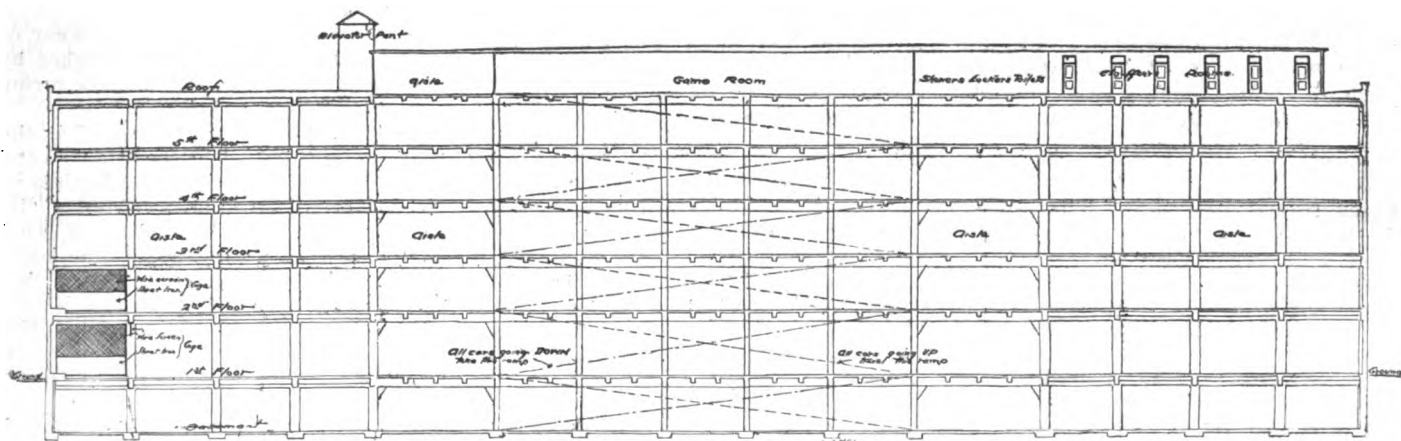
A concrete bumper and conformer will be installed in each garage so as to avoid the necessity of backing and filling in

entering, as the concrete conformer automatically guides the car safely into its place in the centre and against the bumper which stops it.

The aisles and private garages will be amply lighted and every modern device against the possibility of fire will be established, including a fire smothering device and sprinkling system in each cage, interior and exterior, provided with automatic fire extinguishers and steam suppressors. As each car registers, either permanent or transient, it participates in a full value insurance against fire, thievery, collision and injury of any nature while in said Interstate garage. The entire building will be of reinforced concrete, double fireproofed.

The garage will be five stories above the ground and two underneath. The garage will have a total accommodation in private cage garages for 863 cars. There will be 200 rooms for chauffeurs, with baths, showers and a commodious club room, also a club room for owners.

There will be reception rooms for ladies and gentlemen on the ground floor. Other features are: 100 kennels and runways for dogs; an owner's repair room 100 by 90 feet on the top floor; a



Showing Construction of Interior of Building with Caging for Individual Garages, Ramps Leading from Roof to Ground Floor and Chauffeurs' Quarters and Game Room.

general repair room also, 160 by 200 feet on the top floor.

There will be a testing course for cars on the roof to permit the owner or chauffeur to test his car after repairs and correct any defect.

Every precaution has been provided for against fire or combustion of any nature and all of the inflammable materials carried, including gas, oils, greases, etc., will be stored in the lower vault hewn out of solid rock.

Two hundred permanent memberships have been reserved for the permanent residents of the various hotels, club houses and apartment houses in the central zone, which said zone contains the largest number of registered passenger and commercial vehicles of any zone of

Increase In Automobile Tax

Ways and Means Committee Proposes Levy of 10 Per Cent. On Gross Sales of Cars—Tax on Owners and On Gasoline

The Ways and Means Committee of Congress, which has under consideration the new revenue bill has proposed a new and larger tax on both automobile manufacturers and users, as well as a tax of two cents a gallon on gasoline, the latter to be paid by the producers.

On passenger cars the manufacturer will pay 10 per cent. on gross sales instead of three per cent. as at present

More than \$2500 and up to \$3000.... 60
For every \$500 additional cost above \$3000 another \$20.

The committee which is drawing up a revenue bill to raise \$8,000,000 estimates that the new taxes will yield about \$125,000,000 from automobiles and from \$40,000,000 to \$45,000,000 from gasoline.

Representative Claude Kitchin, chairman of the committee made the following statements relatives to its action in fixing the tax rates:

"The committee has had under consideration the excise taxes, such as automobiles, piano players, graphophones, sporting goods and proprietary medicines, cameras, etc., and has tentatively decided to levy a tax of 10 per cent. on the gross sale of the manufacturer, producer or importer. A distinction is made between motor trucks and other classes of automobiles. In the case of motor trucks a tax of only five per cent. was agreed to be levied.

"The tentative increases agreed to compared with the present rate are:

	Present	New
	Pct.	Pct.
Automobiles, all types.....	3	—
Pleasure cars.....	3	10
Trucks	3	5

"We put a tax of \$5 a year on motorcycles. On automobiles, on the original retail listed sale price, whether they were produced in 1918, 1917 or any other year, we put a tax beginning with \$10 a year on cars originally listed at not exceeding \$500. It is immaterial when the user got the car or how old it is.

"We put two cents a gallon on the producer or manufacturer of gasoline, which would yield approximately \$45,000,000."

BOOK ON THE CHAIN DRIVE.

A book of interest to every tractor manufacturer, dealer, designer, owner or salesman has recently been published by the Diamond Chain and Manufacturing Co., Indianapolis, Ind.

"The Final Drive for Tractors," as the book is entitled, discusses fairly and impartially this important mechanism of the tractor. Illustrations of a few of the many tractors on which chain is used as the final drive are shown in the book. Chain drive tractor dealers are using this book as a part of their regular sales literature, and in this connection "The Final Drive for Tractors" is helping to promote tractor sales for chain drive dealers and manufacturers.

A post card request to the Diamond Chain and Manufacturing Co., Indianapolis, Ind., will bring to any reader a copy of the book.

A Generation Ago In Motordom



One of the U. S. Electrics Made by the United States Automobile Company at Attleboro, Mass. This Was One of the Leading and Most Practical Vehicles Produced at the Time and as Shown by the Exacting Demonstration That Was Given of Its Power, It Was Not as Fragile as the Design of the Body Would Seem to Indicate. Even Today a Load of Eight Men in a Car Designed for Four Passengers Would Be Considered Satisfying Proof of Its Capacity and Power.

like size in the United States, extending from 32nd street to 72nd street and from Second avenue to Central Park West. The Interstate Garage is located in the center of this zone.

The management of the parent Interstate Garage in New York consists of the best known hotel managers in the country.

The architects of the Interstate Garage, Parent Co. No. 1, are F. E. Townsend, Esq. and John J. Petit, Esq. All of the innovations employed in the garage have been covered by trade mark patents by the Interstate Garage, Inc.

and will pay five per cent. on trucks as compared with three per cent. now. The owners of automobiles will have to pay a Federal or special tax on "the original listed retail price" of their cars if the rate adopted by the committee becomes a law. This tax will be as follows:

For an automobile costing \$500 and less	\$10
More than \$500 and up to \$750....	15
More than \$750 and up to \$1000....	20
More than \$1000 and up to \$1500....	30
More than \$1500 and up to \$2000....	40
More than \$2000 and up to \$2500....	50

Value to Nation of Automotive Industry

Has Capital of \$1,297,000,000 and 830,000 Employees Receiving \$747,000,000 In Wages.

The scope of the automotive industry and its true importance among the resources of the nation is set forth in a pamphlet issued by the National Automobile Chamber of Commerce, which is in effect a presentation of statistics that deal with totals rather than details. For instance, statement is made that the number of persons employed in the industry is 830,000, and that they with their dependents would populate the city of Chicago, or Philadelphia, Boston and St. Louis combined, or any one of 12 states, or seven states combined.

The wages paid annually, \$747,000,000, are approximately equal to all the gold in circulation in the country. The industry uses capital valued at \$1,297,000,000, which is more by \$250,000,000 than that of all the national banks; greater than the combined capital stock of the Pennsylvania, New York Central, Chicago & Northwestern and the Chicago, Milwaukee & St. Paul railroads; is more than twice the capitalization of the group of 35 Standard Oil companies, and is four times as much as the combined capital of all steel companies save the United States Steel Corporation.

With relation to vehicle possibilities, claim is made that the number of passenger miles with automobiles is not less than 10,000,000,000 greater per year than that of the railroads of the country. The seating capacity of the automobiles in use is 25,000,000, and of railroad cars 3,500,000; that if the railroads were to handle the number of people carried in automobiles, duplication of all passenger cars and locomotives, at a cost of more than \$1,000,000,000, as well as passenger tracks, stations, employees, at incalculable expense, would be necessary.

A possibility is stated: That had an army of 1,000,000 men been mobilized in this country Oct. 1, the automobiles of the United States, traveling 100 miles each a day, with four passengers each, could have carried every man of the army 600,000 miles up to the end of May. Another statement is that during the 16 years after beginning the use of automobiles farm values have increased three times the rate of the previous 20 years, despite the fact that the rate of increase of population, and particularly farm population, decreased during the 16 year period. Another conclusion is that assuming farmers use their cars an average of but 10 miles a day and only one passenger is carried in a car, deprivation of the cars and substitution of horses would result in an aggregate loss of time to the farmers of the country of 300,000 years in every year. Another fact stated is that were the land needed to raise food for the horses of the United

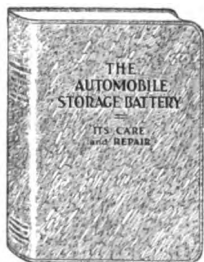
States cultivated with tractors, the crops produced in one year would pay the national debt, including all Liberty bonds issued to date. Copies of the folder may be obtained by addressing the chamber at 7 East 42nd street, New York City.

"THE AUTOMOBILE STORAGE BATTERY."

"The Automobile Storage Battery" is the title of a very comprehensive and authentic treatise on lead-acid electric secondary batteries, published by the American Bureau of Engineering, Chicago, which is in two sections, the first devoted to theory and practice and the second to repair and maintenance. The work is so written and illustrated that it will be a very great assistance to any one who has to do with electric batteries, whether an owner who desires to obtain the largest measure of battery efficiency at the least expense, the battery man who must repair and restore cells, or the owner of a station or garage who desires to afford satisfying service to his patrons.

No work of this character can give a man mechanical knowledge or experience, but practically any owner or mechanic can, by following the suggestions in the book, determine any condition that might obtain in normal use, and by reasonable care maintain batteries so that a much larger ratio of service, efficiency and life can be obtained. For those who are experienced with batteries, either use or maintenance, the book contains much information that will serve a distinctly useful purpose.

The book is systematically arranged and it is illustrated with many half tone cuts from exclusive photos, made by a battery man of unusually wide experience. These present conditions clearly that might not always be understood from description alone. There are complete instructions relative to charging, and the trouble chart is developed with reference to determining practically any cause for reduction of capacity or failure.



"The Automobile Storage Battery" Handbook.

The book is admirably made up and printed on heavy paper, with tabulation of contents and index of subjects, and is bound with a flexible leather cover. It is obtainable from the American Bureau of Engineering, 1018-24 South Wabash avenue, Chicago, and the price is \$5.

FORD RUMORS UNFOUNDED.

Rumors that the Ford Motor Car Co. would stop making automobiles and manufacture munitions exclusively, has been denied by officials of the company. "Our output of cars is limited because of the steel shortage," said an official, "but we are turning out 700 cars daily."

YMCA Appeals for Drivers and Mechanics

Overseas Motor Department Makes Appeal for Volunteers to Aid in War Work.

The National War Work Council of the Young Men's Christian Association is making an appeal for expert power vehicle drivers and mechanics to volunteer for service in war work in France. The need was never so urgent. The work of the association has increased greatly with the mobilization of American armies in France and Italy. There is every reason to believe that the demands will greatly exceed those that are now being met with much difficulty, and unless the association can continue its activities to the fullest extent the American forces will not have the support that is given them physically, morally and spiritually by the Y. M. C. A.

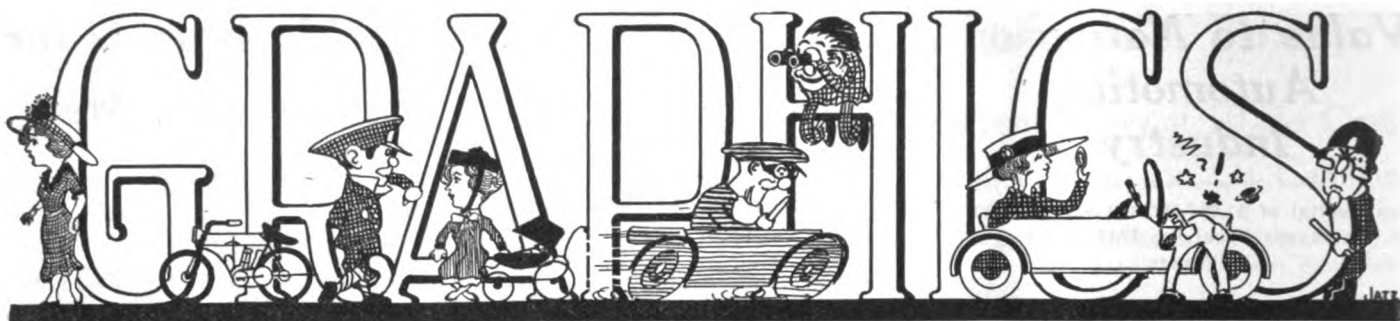
The workers of the Red Triangle serve for the common good of mankind, for the association does not recognize race, nationality or creed. The success of its activities depend very largely upon its power vehicles being maintained operative. The Overseas Motor Department, which maintains the machines, has made appeal for volunteers. It cannot augment its forces save by men volunteering their service.

There never was a time in the history of this country when the opportunity for volunteer service was so great for men over military age who can engage in Y. M. C. A. service. Garage owners and automobile dealers are urged to prepare themselves to not only give up, but seek the opportunity to offer the services of mechanical experts.

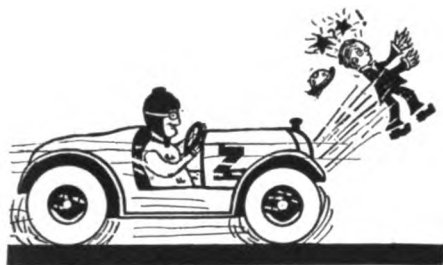
America has more than met every call that has been made upon her as a nation, and patriots whose ages deny them the privilege of joining the colors, who are qualified by driving or mechanical experience, can serve the cause just as effectually by doing Red Triangle war work behind the battle lines. Any Y. M. C. A. secretary will give full particulars at request.

NO INTERFERENCE WITH GOVERNMENT AUTOMOBILES.

Commissioner of Motor Vehicles Robbins B. Stoeckel of Connecticut has made a ruling touching on the relations between automobiles owned and operated by the United States government and the motor vehicles commission. Commissioner Stoeckel makes it plain that no state inspector has any right to interfere with any car bearing government designation, although such cars violating the law may be held up for the purpose of securing information as to their status.



Morris Gold of Passaic, N. J., finds himself in a position just the reverse of the famous lady who had a goose which laid golden eggs. While it is true that he has a hen that lays eggs for gold, through extravagant habits that his sportive leghorn developed when he bought a new car, she refuses to produce the material for omelettes unless en route on a joy ride. When Gold had his old car biddy was very shy and disdained to even flutter when he opened the cut-out, but from the day he appeared in the barn yard with a new bus her entire nature changed. At the click of the key in the switch the hen flies to the tonneau and at the end of a brief spin rewards her owner with a fresh egg, which is valued at the rate of about \$5 per dozen figuring the gasoline consumption per egg-mile. So far Gold has experienced little notoriety from having a

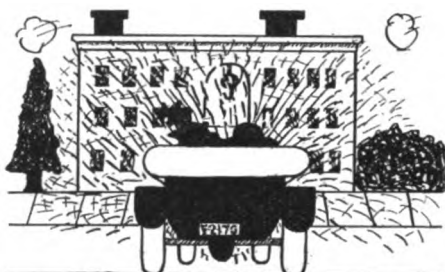


hen as a companion on his trips about town, as the neighbors willingly concede him the privilege as long as he abjures the chickens.

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To the motorist who realizes that 25 per cent. of the power delivered by his engine is lost in friction, the question of lubrication is one of paramount importance. Grease cups are gone over, oil reservoirs are watched carefully, bearings are inspected regularly and frequently cleaned.

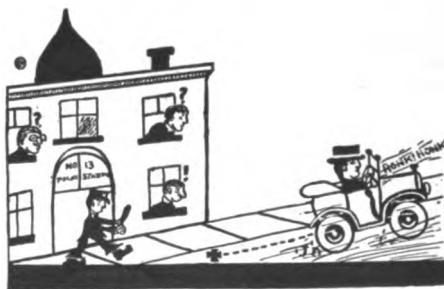
Care in the selection of lubricants is important to him, too, as he realizes that each bearing, gear or spring requires its particular kind of lubricant. Engineers who are experts in the line of automobile lubrication point out that plain oils and greases squeeze out under great pressure and heat. When flake Motor Graphite is mixed in, however, the oil or grease serves as a vehicle to carry the graphite to all parts of the bearing or part to be lubricated. The flakes of graphite adhere to the surface, fill all the minute irregularities and form a tough, durable film, which prevents metallic contact. The graphite does not squeeze out.



Probably the costliest automobile accident on record was that which happened in Springfield, Mass., where the store of the J. S. Bailey Co. was damaged to the extent of \$150,000 by water from a hydrant that had been broken off by a skidding motor car. Through the peculiar nature of the break in the hydrant the water was directed against the top story of the three-story building and ran down through all floors for half an hour, flooding the structure, as well as undermining the sidewalks in front.

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That there are extenuating circumstances in violations of the speed law was shown in a New York court recently when a justice dismissed a charge brought against a chauffeur who had served as an aviator in France. Eugene J. Joyce, the chauffeur, told the justice, when arraigned, that he had qualified as an aviator at the San Antonio, Tex., field and had sailed with the first contingent of the American Expeditionary Forces to France. He brought down two German planes and last December when his machine crashed to the ground a stay in one of the wings penetrated his lung, incapacitating him for further service. He was decorated with the Cross de Guerre. The justice did not state his specific reasons for dismissing the charge, but he undoubtedly reasoned that aside from the notable service Joyce had rendered his country, a person who had been accustomed to hitting it up at 100 or 120 miles an hour was excusable on general principles when required to throttle down to about 20 miles an hour.



There have been innumerable instances of exceptional boldness and daring among automobile thieves and not long ago in Providence the judge of one of the higher courts came from the bench with expectation of an exhilarating ride home to find that his machine had been appropriated while he was dealing out law and justice. A case of equal boldness, only one in which the victim was the object of the law and justice, happened recently in New York. G. Castaldo was in the traffic court pleading to a charge of overspeeding when suddenly he made a bolt for the door. His lawyer explained his sudden exit to the court by announcing that someone had stolen his client's car from in front of the court house. "My dear counsellor I didn't take it," replied the magistrate, after which a detective on



duty in the room went out and caught the car thieves, who proved to be two little boys, whose moral stamina gave away under an irresistible desire to utilize the car while its owner was inside explaining his irresistible desire to hit it up occasionally.

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John N. Willys, president of the Willys-Overland Co., is very optimistic over the future of the motor industry, as indicated by a statement he recently made concerning his own company and the outlook in general.

"Present and future position of automobile industry as a whole is fine." He says, "I speak particularly of concerns which manufacture parts and have equipment and frequently space for handling contracts freely offered by the government. As passenger car production is lowered plant capacity is taken by war orders. Profits on the latter are reasonable and volume is so large we should this year make \$9,000,000.

"Automobiles already produced are being used up and the supply is being reduced. After the war the demand for automobiles will be enlarged and our capacity will then be freed from war orders. Steel will then be plentiful and the activity in the automobile industry promises to be larger than ever before.

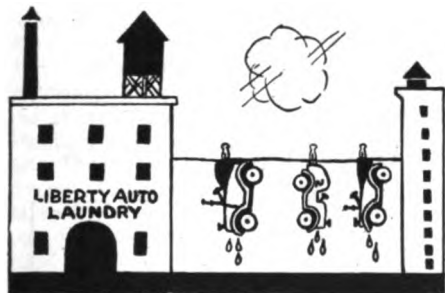
Of the many novel campaigns throughout the country to boost thrift stamp sales, one plan adopted in Providence brought exceptional results, at the same time providing the citizens with a good time. Automobile owners were asked to bring their old worn out tires to the main square in the city, where an attendant weighed them to determine their junk value, which was paid to the owners in thrift stamps. At the other end of the square a booth rigged after the style of the famous African dodger out-



fits, only that in place of the elusive negro as a target, an effigy of the Kaiser was the more alluring temptation to try one's aim, did a thriving business, each purchaser being allowed three shots for every thrift stamp he paid for.

Houston, Tex., although thousands of miles from the large centers of culture and learning, like many other western cities, has been the birth place of numerous and progressive business ideas that have later been instituted throughout the country. The latest from this city of the Lone Star state is the Liberty Auto Laundry, which recently opened its doors. M. L. Moody and J. C. Milner, the proprietors and originators of this new service to automobile owners, erected a new building specially designed and equipped for the purpose.

The Liberty Auto Laundry expects to meet a long-felt want among Houston auto owners and has placed vacuum, electric and compressed air systems at the command of patrons, together with the services of an expert on proper lu-



brication and body washing and polishing.

"Heretofore it has always been necessary to take an automobile to a garage to have it lubricated and washed or polished, where the work is considered of secondary importance," Mr. Moody says, "but in view of the fact that the life of a car both inside and out is largely dependent on these details of automobile work we feel that we will solve a problem for Houston motorists. Also having this class of work done has generally been an inconvenience to autoists because their work was often considerably

delayed. However, we have a capacity at present of 80 cars daily and invite motorists to leave their autos while shopping or keeping business appointments and we are equipped to turn out the work in from 30 to 50 minutes per car and make it a rule to oversee all and overlook no work."

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Action is being taken by the city council of Canton, O., to change the name of Tuscawaros street to Lincoln Highway, this thoroughfare being the official route through the city. This action follows a precedent established in many communities along the Lincoln Highway where the street or highway locally designated as part of the transcontinental route has been renamed "Lincoln Highway."

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Brig.-Gen. Ruckman has given warning that the use of the road between Boston and Camp Devens as a speedway for motor cars must cease. Maj. Fred MacDonald, in charge of the United States Guards, declares that arrests will follow if the warnings are not heeded. Fast motorcycles are to be used to apprehend the offenders.

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"Did it ever occur to you that tires have a 'sense of direction?' says the Goodrich Rubber Co. bulletin. Well they have. Tires develop little moods that are almost human and they adhere to them very stubbornly and he who seeks to change them usually pays the bills.

"For instance, when a tire has been on a wheel for some time the rubber has adjusted itself to its position thereon—that is, the rubber shapes itself to run in one direction. It stretches in one direction, it strains in one direction, it recedes before a blow in one direction. Therefore when a motorist removes a tire for repairs or for any other purpose he should observe religiously the tire's 'sense of direction.'

"Ninety-nine out of every 100 motorists—or perhaps the percentage is even greater—never give this feature a thought. They replace the tire any old way—usually with the "reverse" side exposed to meet the shocks and blows of the road. The result is much more rapid wear to the tires.

"A car owner in removing a tire should mark an arrow on it indicating the direction the tire has been running. Thus in replacing it he could see the tire was adjusted to run in the right direction. It would be well to follow the same idea in regard to a spare tire—mark an arrow to indicate the direction in which the tire has been running."

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Vacancies caused by the enlistment of workers from the Cadillac Boston distributor's repair shop are being rapidly filled by men beyond the draft age, who are being trained for the work.

In a corner of the repair shop has been set up this mechanics' training school. The instructor is a mechanic, who possesses both the ability to work with tools and the faculty of imparting his knowledge and the fruit of his experience to others.

Each student is provided with a set of tools, paying for them at actual cost. He also signs an agreement relative to his wages, providing that his services are found satisfactory after he has finished training. The pay is on a rising scale until the end of his first year, when he is to receive the sum which his services are worth to the employing company. The jobs are made more attractive by provision for a bonus for the first two years of employment.

The school has been under way for three months, and the initial results



have been very successful. In several instances men have already been graduated into the regular work in the main shop.

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A. G. Lupton of Hartford City was re-elected president of the Hoosier State Automobile Association at the third annual meeting. All other officers were also re-elected as follows: First vice president, Martin Luecke, Fort Wayne; second vice president, M. O. Reeves, Columbus; third vice president, D. M. Peck, Crawfordsville; fourth vice president, W. C. Hands, Union City; treasurer, Thomas A. Wynn, Indianapolis; secretary, M. E. Noblet, Indianapolis.

J. I. Blakeslee, fourth assistant postmaster-general, outlined at the evening session the proposed national highway from Portland, Me., to New Orleans, which is designed to pass through Indiana. It is proposed to use the route



and its tributaries as star routes for mail service.

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A motorist drove through Stoneham square, Boston, recently with some old Massachusetts number plates reversed, the blank side thereof bearing the words, "License Applied For." This expedient to avoid prosecution, while obtaining a few hours joy in the car minus license plates, failed to work, as while the traffic cop appreciated the joke, he did not allow his sense of humor to deter him from duty and arrested the operator and took his car to the police garage.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration



A Fleet of Army Trucks Built at the Plant of the Selden Motor Vehicle Co., Rochester, N. Y., Assembled in Readiness for Shipment.

The Rapid-Change Wheel Co., Grand Rapids, Mich., has been formed with a capital of \$50,000. The company will make a new supplemental hub for motor cars. The officers are: John S. Noel, president; J. Seman, vice president; Louis Dolan, secretary, and H. Hagen, treasurer.

The Willys-Overland Co., Toledo, O., is erecting several additions to its plant, the largest of which will be 300 feet long and one-story high and will cost \$225,000. It will be used as a machine shop for making shells. The other additions are a boiler room, costing \$65,430, and an extension to one of the factory offices at a cost of \$15,000.

Master Trucks, Inc., Chicago, will erect a new plant. The company is making two trucks and a tractor.

The Goodyear Tire and Rubber Co., Akron, O., for the benefit of its employees has opened outdoor moving picture shows. The company's athletic field is used for the purpose and pictures are shown there twice each week. The subjects shown are the popular com-

ics, war films, good dramas and a weekly pictorial review of Goodyear activities.

The Comet Automobile Co. has moved into its newly constructed plant at William street and Broadway. The building of cars and trucks is being rushed.

The Metal Auto Parts Co., Des Moines, Ia., has been organized to manufacture accessories for cars. The officers are Jack Messenger, president; T. A. Tooey, vice president; E. M. Messenger, secretary, and C. A. Messenger, treasurer.

The Gary Motor Truck Co., Gary, Ind., will erect an addition to its plant which will increase production from 500 to 1500 vehicles a year. The company's capital has been increased from \$175,000 to \$1,000,000.

The Republic Motor Truck Co., Alma, Mich., has opened a factory branch at Baltimore, Md., and has taken over the business of Habersham-Miller, Inc. The president of the reorganized company is L. Van Bunkirk. Herbert L. Charlack is vice president and A. J. Kenny secretary and treasurer. They have all been

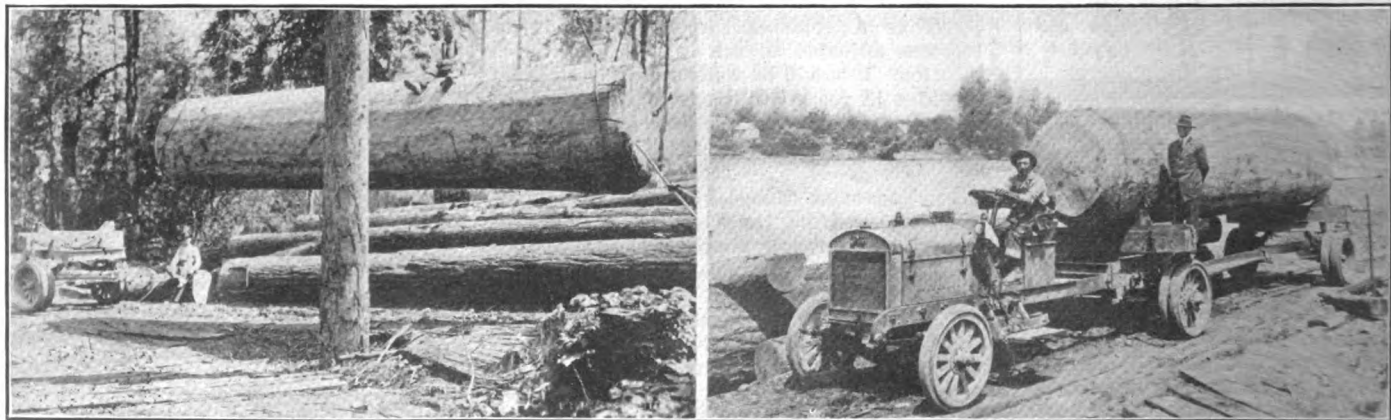
associated with the Studebaker organization for some time.

The Stanley Motor Carriage Co., Newton, Mass., has appointed the following dealers as representing the Stanley steam car: Adrian A. Lajous, Viamonte 939, Buenos Aires, Argentina; the Howard Co., 250 Boulevard, New Haven, Conn.; Cox & Timmons, Bloomington, Ill.; Boyd & Dance, Peru, Ill.; Perkins Sales Co., 36 Bank Place, Utica, N. Y.; Northern Garage Co., Northern avenue, Avondale, Cincinnati, O.; Paul Trumbower, 728 Main Washington avenue, Washington, N. J.; Willard Boggs Co., Spartanburg, S. C.; Richmond Sales Co., 1615 West Broad street, Richmond, Va.; Lincoln Motor Sales Co., Sistersville, W. Va.; Electrical Construction Co., 510-512 College avenue, Racine, Wis.; Roethke Bros., Inc., 11th and Monticello streets, Norfolk, Va.; Watkins Motor Co., 515 Poplar street, Macon, Ga.

The Chandler Motor Car Co., Cleveland, O., will erect two more tractor buildings and enlarge two of its office buildings.

The Studebaker Corporation, South Bend, Ind., has added a sedan to its series 1919 models. The model will be fitted to both the four and six-cylinder chassis, the four listing at \$1685 and the six at \$2185. The two bodies are practically the same, both seating five passengers. The upholstery is high grade cloth laid in parallel pleats and equipment includes a dome light, silk roller curtains, door locks and a three-piece windshield with adjustable visor. The finish is Studebaker blue with the chassis and upper half of the body black.

The Blumberg Manufacturing Co., San Antonio, Tex., will build a plant at Orange for the manufacture of farm tractors. The new tractor will be different from any now on the market. It is adapted especially for use upon rice plantations and irrigated farms.



Lumbering in the Northwestern Fir Forests: At Left, Log Hoisted for Loading Semi-Trailer; at Right, GMC Tractor Hauling a Single Log Containing 3380 Board Feet as a Load.

The Premier Motor Corporation, Indianapolis, Ind., has advanced the prices of the Premier cars and are as follows: Seven-passenger touring car, \$2585; four-passenger foursome, \$2585; seven-passenger Berline-sedan, \$3585.

The Corcoran Manufacturing Co., Cincinnati, O., will have in operation the new plant at Norwood, a suburb of Cincinnati, O., by August, and will employ about 400 men. The company manufactures fenders, radiators, tool boxes, tire pumps and sheet metal parts for automobiles.

The Olds Motor Works, Lansing, Mich., is erecting a new building for the manufacture of automobile engines. The engines were formerly supplied by the Northway Motor Co. of Detroit, Mich., but the company is now engaged in war work and is unable to supply engines for the Oldsmobile company. The building will be 550 by 240 feet and with an addition of a loading dock.

The Northwestern Auto Supply Co., Billings, Mont., has opened a school for its employees in order to develop the ability among its women workers. The

to manufacture and market K. A. L. products. The line which the company will produce includes body polishes for motor cars, hood and fender dressing, carbon remover and oil and greases. John F. Healy is the manager.

The Falls Motors Corporation, Sheboygan Falls, Wis., has given to its 500 employees a club house for their exclusive use and benefit. The club contains a library and reading room, pool and billiard hall, auditorium for dancing and theatricals and several smaller rooms for group meetings. The basement is provided with bowling alleys and gymnastic apparatus. Tuesday evening is for the ladies and their guests.

The Sandusky Tire and Rubber Co., Sandusky, O., will build a new plant, which will be completed within six months, when about 200 men will be employed.

Emil Grossman Manufacturing Corporation, Brooklyn, N. Y., has received a contract from the Postoffice Department in Washington for Red Head Vitriscene spark plugs.

The Transport Truck Co., Mt. Pleas-

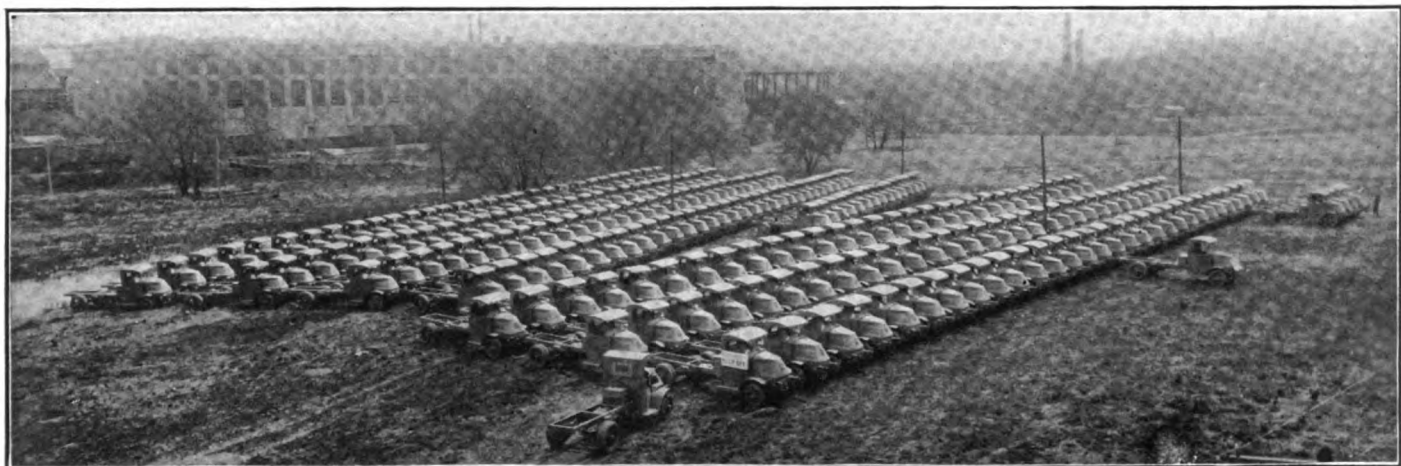
The company is manufacturer of radiator covers.

The Hyatt Roller Bearing Co. of Chicago, Ill., has opened a branch office in San Francisco, Cal., where the Pacific coast trade will be handled by A. W. Fisher.

The Automotive Battery Corporation, Boston, Mass., has taken over the service of the Prest-O-Lite products. The president and general manager is James MacKenzie. He was formerly in charge of the Willard battery interests at Springfield, Mass. J. A. O'Donnell still retains the position as representative of the factory in New England.

The Harroun Motors Corporation, Wayne, Mich., is in operation and giving employment to 300 persons. As soon as the machinery is installed three more units will be in operation. The daily car production of nearly 200 per week is being maintained.

The Northwest Motor Co., Seattle, will erect a foundry and machine shop on the Duwanish waterway to cost \$150,000 for the initial plant. The president is A. P. Nute. The foundry will be 90 by



More Than 200 Mack Trucks Lined for Inspection Before Acceptance by the Quartermaster Corps, U. S. A., Intended for Service in France When Equipped with Bodies.

company is a jobber in motor car accessories. C. H. Moore will be in charge. He is general superintendent and an expert mechanic.

The Dart Motor Truck Co., Waterloo, Ia., has reorganized as the Dart Truck and Tractor Corporation. The staff of officers will remain unchanged. The company will continue to manufacture its present line of heavy duty, worm drive trucks in the 1, 2 and 3½-ton sizes. A new tractor has been developed, known as the Dart Blue J tractor. A factory addition has been added, 250 feet long. During the first six months business has increased over 200 per cent.

Lapeer Tractor-Truck Co., Lapeer, Mich., has completed the erection of its plant, which is a two-story structure, 60 by 200 feet. New machinery is being installed and the plant will be ready within the next two weeks. The company has a capital stock of \$100,000. The officers are: W. H. Tucker, president; C. W. Smith, vice president; E. E. Mix, secretary; R. T. Carpenter, treasurer.

The Furniture City Laboratories, Grand Rapids, Mich., has been organized

ant, Mich., has been formed by Milton A. Holmes, who was sales manager and vice president of the Republic Motor Truck Co., Alma, Mich. The company will build two buildings, each 80 by 700 feet, and will manufacture trucks.

The Traffic Motor Truck Corporation, St. Louis, Mo., is producing 300 trucks a month and will make an exhibition of its two-ton trucks at the National Automotive and Accessory Exposition in Chicago, Sept. 14-21.

The Hurlburt Motor Truck Co., Philadelphia, Pa., will erect a factory branch on Broad street, near Columbia avenue. The new building will be used for offices and a sales and service station. P. C. Chrysler will be manager.

The Sanford Motor Truck Co., Syracuse, N. Y., has increased the prices of its 3½ and five-ton trucks, effective Aug. 1. The new prices are as follows: Model W-35, 3½ ton, \$3975; W-50, five ton, \$4750.

The M. I. Wilcox Co., Toledo, O., is working on a government order for tents at the new plant No. 3. It is a three-story building with basement and contains 30,000 square feet of floor space.

250 feet, equipped with iron melting cupola, electric steel furnace and overhead traveling crane.

The Service Motor Co., Wabash, Ind., has let contracts for five one-story buildings, each 75 feet wide, with a total length of 1350 feet. It has a government contract for 10,000 military trucks.

The Bock Bearing Co., Toledo, O., will erect extensions which will double its capacity. The plant is one of the units of the Standard Parts Co., Cleveland. The company now employs 800 and by winter this number will be increased to 1600. The expansion was made necessary by the government specifications of Bock bearings for army trucks and cars.

The Saxon Motor Car Corporation, Detroit, has removed its general offices to 917 Beaufort avenue. The offices will now be opposite its main plant.

The Firestone Tire and Rubber Co., Akron, O., reports total sales of more than \$7,000,000 for April. This is 37 per cent. increase over the corresponding period last year and is the largest month's business in the history of the company.

A Gasoline Mercury

This Man Has Driven Notable Figures
from Every Corner of the Globe

In the early days when the horseless buggy first appeared on the city streets and country highways, every automobile was an object of universal interest to the admiring or skeptical throngs that crowded the road way to see it pass. Each of these automobiles was an event. The man who owned it was a personage in the community, and his car was no less a personage than he. Every one in the city or village knew all about it—its bad habits and its good; what it ate and how much work it would do for its food. It was known to the entire community, by its first name as it were. It could truly be said to have had individuality.

The enormous growth of the industry naturally changed this. The automobile came to be a machine and no more. The millions of amateur experts throughout the world ceased to stand in the light of personal friends to individual automobiles. The motor car was to them no longer a thing of temperamental personality, but an ingenious combination of mechanical parts that would always produce certain results when operated under certain conditions. The automobile had lost its individuality. Nevertheless, there are automobiles even in these crowded days that have about them the person distinction that was their forefathers. These are machines which through constant association with greatness have taken on something of the personality of those who have ridden in them. Theirs is a reflected glory, but one that is none the less real. They are the aristocrats among motor cars.

One of the most famous of these cars is the Locomobile, which belongs to the Crocker National Bank of San Francisco. It is doubtful if any other motor car has carried so many famous people as this one. It is doubtful if any man has ever had entrusted to his hands so many lives important to the world's progress as has Clark Hunt, the Crocker National Bank chauffeur.

Every statesman who makes an American tour of any duration goes to San Francisco. It is the one city that typifies the whole Pacific coast. Every visiting ruler, every speech making political candidate, every lecturing college president visits the city by the "Golden Gate." To these strangers within the gates Mr. William S. Crocker has acted as host, driving them wherever they wished to go, through the crowded city streets, along the open country road way, in order that they might admire to the full the beauties of his city. From being a means of extending courtesies the bank car has become a symbol of the great open handed hospitality of the West.

The busiest time of Clark Hunt's life was during the Panama Pacific International Exposition, which brought to-

gether as commissioners distinguished men from all four corners of the world. It was a glorious opportunity for Clark Hunt to serve and he grasped it. The following are some of the commissioners whom he drove: Haruki Yamawaki of Japan, Vahan Cardashian of Turkey, Ernest Nathan of Italy, Horacia Amasgasti of Argentina, M. V. Baelivian of Norway, Eduardo Periotti of Uruguay, Richard Bernstrom of Sweden, H. Vedel of Denmark, H. A. Van Coenen Torchiana of Netherland, C. J. K. Aalst of Netherland, CH'n Chi of China, Enrique Loynes del Castillo of Cuba, Alfred Deaken of Australia, Edmund Clifton of New Zealand, Frederick Elkuera of Peru, Manuel Rolden of Portugal and Albert Tirman of France.

It is probable that no American except perhaps the proud and ancient colored butler of the White House has known so many distinguished American statesmen as has Clark Hunt. He drove that most American of Americans, Theodore Roosevelt, when he was President of the United States. Another of his distinguished passengers was Ex-President William H. Taft. When Hughes made his ill starred trip to California in the summer of '16 he rode in the Crocker National Bank car behind Clark Hunt. Governor Whitman of New York did likewise on his equally famous western trip. The late Seth Lowe, then Mayor of New York, and Myron C. Herrick, former ambassador to France, are among the other political guests of the bank.

It is a matter of doubt whether Mr. William G. McAdoo should be classed as a banker or a statesman. Whichever he may be called he also is one of the elect. If he be a banker he makes a distinguished trio with Frank A. Vanderlip and Bernard M. Baruche.

Some of the most famous educators and greater inventors of America have been among the guests of the Crocker National Bank. Among them may be mentioned Thomas A. Edison, John Haynes Hammond, Arthur T. Hadley, president of the Yale University, and Nicholas Murray Butler, president of the Columbia University.

Among Clark Hunt's other passengers of international fame are Prince A. Poniatowsky, Henry Fairfield Osborne, president of the American Museum of Natural History; Dr. M. P. Rooseboom, assistant secretary of the Hague Tribunal; Madam Nellis Melba, Robert Lovett, president of the Union Pacific Railway; Louis Tiffany of Tiffanys; the Sultan of Sulu, Prince Troubetskoy of Russia and the world's greatest pianist, Ignace Paderewski.

Since the war broke out Mr. Hunt has been even busier than usual carrying about San Francisco the special missions

accredited to the United States by the Allied governments.

The Belgian Mission, composed of Baron Moncheur, Lieutenant-General Leclercq, Major Osterrieth, Lieutenant Count D'Ursel and James G. Whitely, and the special Japanese Mission, among whom were Viscount K. Ishii, ambassador extraordinary and plenipotentiary; Mr. Matsuzo Nagai, secretary of the Department for Foreign Affairs; Major-General H. Sugano, Imperial Japanese Navy; Vice Admiral Tsam Takeshita, Imperial Japanese Navy; Mr. Masanao Hanikara, Consul General of Japan; Lieutenant-Colonel S. Tanikawa, Imperial Japanese Navy; Commander Masataka Ando, Imperial Japanese Navy; Tadanao Imai, Vice Consul of Japan, are among the most recently acquired of Clark Hunt's friends.

It is the lot of many a man to serve one of the world's heroes. It is doubtful whether it is the lot of any other man to have served so many of them.

WALDEN-WORCESTER INC. OPENS BRANCH OFFICE IN CHICAGO.

The Walden-Worcester, Inc., the well known wrench manufacturers of



W. F. Opdyke, Manager of
Chicago Branch of Walden-
Worcester, Inc.

Worcester, Mass., have opened a branch office in Chicago at 452 Monadnock building, Jackson boulevard, opposite the postoffice.

The office will be in charge of Messrs. Craig and Opdyke, the former well known to all the company's western cus-



L. H. Craig, Formerly with
the Crescent Tool Co.

tomers and the latter will be remembered through his former connection with the Crescent Tool Co.

Woman Expert Gives Advice on Operating Car

Covered Trip of 1017 Miles in 40 Hours, Traveling Ten Hours a Day For Four Days

"There is No Reason Why Women Cannot Make Success of Driving"—She Says.

"There is no reason, in my opinion, why women cannot make a success of driving. They are the equal of men in other things and should be in driving motor cars," says Mrs. Grace Damon Boyson, who is one of the most experienced women drivers in America, if not in the world.

Mrs. Boyson, who is a resident of Winthrop, Mass., and the first woman in that state to receive a driver's license, has been operating automobiles for the past 16 years. She has not confined her attention, however, to merely handling the wheel and controls, but is prepared in case of emergency to fix any part of the mechanism should occasion require it.

She has made many long cross country trips and this spring drove a new car from Pontiac, Mich., to Boston, a distance of 1017 miles, in 40 hours, elapsed time, driving an average of 10 hours a day for four days. This was a remarkable performance in view of the fact that the roads were in very poor condition from Detroit to Erie, Pa., where for 16 miles the highways were so deeply rutted the brakes dragged in the mud. Another stretch of 304 miles was covered in a torrential rain storm.

Over 12 years ago, when the road systems were only an apology for what they are today, Mrs. Boyson drove from Buffalo, N. Y., to Boston, a distance of 550 miles, in three and a half days. She has never had an accident in all her years of driving, which is additional proof, aside from her experience, of her authority to speak as an expert.

"One of the reasons why I got such splendid mileage on my recent trip (21 miles to a gallon of gas) was because I coasted every hill where it was possible, sometimes shutting off the engine entirely and at other times just throwing out the clutch. Of course this is not advisable where traffic is thick, for naturally in places of that sort, one must have their engine under control, but it is a wonderful stunt as far as saving of gas, where conditions are right.

"Another thing which is often done by women drivers to the detriment of their car is the fact that they wait too long before they shift their gears, I mean going up a hill. The second gear is there just for that purpose. But some drivers will strain and strain their car and jerk along and I know where a friend of mine broke her shaft because she never changed soon enough.

"I have been enrolled as an

ambulance driver in our new Red Cross Voluntary Ambulance Corps.

"All women should learn first to drive a car with the hand throttle on the wheel," says Mrs. Boyson. "That is the only safe way. Unless she is very quick to think, a new driver has always the instinctive feeling that when trouble comes she should push hard with both



Grace Damon Boyson, Driver in Red Cross Infantry Ambulance Corps.

feet. And so she should, if her feet are on the clutch and on the brake. But if one foot is on the foot accelerator she is very apt not to think to change the position of her foot.

"I never drive myself with the accelerator when I am in thick traffic, as in the city. Theoretical talk about how easy it is to shift from the accelerator to the brake is all right, but practise shows that many an accident has happened just on that account.

"I love to drive in thick traffic. It seems to be like a game—a putting of my wits against those of every other driver and pedestrian.

"There is another thing that women don't understand, and that is about stalling the engine of a car. They can shift gears and put on the brakes; but the last thing they think of in an emergency is throwing out the clutch. Most women drivers know nothing, and, therefore, fear nothing.

"The costume for women to wear when driving in this weather is a leather coat to keep out dust, rain and wind, a good heavy and short skirt, and heavy riding boots. Working the clutch and brake are hard on the ankles and the heavy and high boots are needed. No open necks should be worn, but a close, high collar. This will keep one clean and presentable and, in a car, it is never so hot but one can get enough air. Dress for the job, no matter what it is.

"Women in these war times should learn thoroughly the mechanism of the car. They should be able to adjust the timer and to fix any out about the carburetor as well as to repair any trouble due to the tires. If women are to be a help in driving cars during the war, they

should know all about them and not half only. The field is broad and women will have to go into it, in my opinion.

"But there is one thing, unless a woman has a trend of thought toward mechanics she should not try to learn to drive and care for a car. She should turn to some other hobby and let cars alone. She must know the whys and then she will know the wherefores.

"Nervous women should not attempt to drive cars. It is the instinctive desire of the nervous woman to throw up her hands when trouble comes and that is just what she should not do in such a case. Her hands are needed just then to get her out of her difficulty.

"Another thing a woman should never neglect to do when driving a car—that is to blow the horn whenever it is necessary. Too many women—and men, too—think it sporty not to blow the horn; but I tell you, on my recent trip I saw the reason for alertness in horn blowing as never before.

"Also women make a great mistake when approaching a hard place if they do not begin to put on the brake some ways back instead of waiting until the car arrives at the bad spot. In other words, don't jam on brakes. It is not sporty and it is not safe. It ruins the brakes and places one near to an accident.

"My advice to women is to keep the car well oiled and well greased. Neither ever hurt a car yet, but the absence of either may ruin a car.

"Keep the water in the radiator clear. Change it every 500 miles at least. Let all the old grease out occasionally. It loses its virtue in time and the new is needed.

"Those with near-sightedness or deafness should never drive a car. It is dangerous for them and for all they meet.

"Driving a car is the best thing in the world for the health of a woman. I have never been ill a day since I began to drive. It will add 10 years to a woman's life. It is a fine cure for indigestion.

"Another thing it does is to do away with all fastidiousness; the woman who, before driving, would not eat until she could eat properly, will, after driving, go into a 'one-arm' lunchery without a word and eat anything there is in sight.

"Obey the traffic rules in every town you are in. This is important and shows who the good drivers are. Never hog the road. Such drivers should be called down and they are, too, when a good driver draws abreast of them.

"Motor car driving is a wonderful sport. It teaches one accuracy, quickness and confidence.

Personal News of the Industry in Brief

Harry A. Conlon, for about a year connected with the Acacon Motor Truck Co., Detroit, as sales manager and assistant to Vice President J. F. Bowman, has succeeded to the position of vice president and director of sales of the company which Mr. Bowman has just resigned.

H. G. Wedler, for six years sales representative of the Emil Grossman Manufacturing Corporation, Brooklyn, N. Y., in the South and Middle West territory, has joined the colors and is now in the mechanical repair shops at Unit 305, Camp Jessup, Atlanta, Ga.

W. S. Carleton has accepted a position in the production division of the Emergency Fleet Corporation, with headquarters at Philadelphia. For the past nine years he was associated with the Boston branch of the Republic Rubber Corporation. Mr. Carleton is very well known to the tire and rubber men in the New England territory. Corliss Wadleigh is the successor to Mr. Carleton as district manager of the Boston branch.

Prescott C. Ritchie has been appointed district representative of the Westinghouse Electric and Manufacturing Co. in their western district, with headquarters at Indianapolis, Ind. He succeeds H. S. Johnson, who has resigned. Mr. Ritchie has had a considerable experience in the automobile industry, having been in charge of headquarters inquiry work for the western district in the main offices of the company and prior to that time he was connected with the Thomas B. Jeffery Co. at Kenosha, Wis.

W. T. Woodrow is now manager of the Manitowoc, Wis., plant of the Aluminum Castings Co., with main offices in Cleveland, O., to succeed Howard Emery, who was promoted to the plant at Detroit.



Harry A. Conlon, Vice President and Director of Sales, Acacon Motor Truck Co.

Finley R. Porter has joined the government establishment at McCook Field, Dayton, O., as airplane engineer in charge of engine development. He was formerly chief engineer of the Mercer Motor Car Co., and afterward designer of the F. R. P. cars at Port Jefferson, L. I.

William J. Greene, formerly with the Vul-Tex Co., Barberton, O., has joined the sales force of the Marathon Tire and Rubber Co., Cuyahoga Falls, O., in charge of the department of soles, heels, belts and specialties. A large addition for the manufacture of these lines has been completed.

Fred A. Wade is now purchasing agent of the motor car division of the Studebaker Corporation, with headquarters at Detroit. He was formerly superintendent of purchases of the Buick Motor Co. and also purchasing agent of the Ford Motor Co. and later connected with the E-M-F company and the Studebaker Corporation.

Bert Miller is now in the ordnance department of the Harroun Motors Corporation, Wayne, Mich. He was former general foreman of the heat treating department of the Studebaker Corporation, Detroit. Prior to his connection with the Studebaker he supervised the heat treating plants for the government at the Washington navy yard and the Panama Canal zone.

Wesley Deem has been appointed production manager of the Lane Motor Truck Co., Kalamazoo, Mich. He was former production manager of the Columbia Motors Co., Detroit.

O. F. Conklin has been appointed general manager of all Remy Electric Co.'s interests, succeeding H. W. Griffith. G. V. McMahan, who has been with the Remy company for six years as sales manager of the motor equipment division, has been appointed assistant general manager.

Carl R. Jones, branch manager of the Bearings Service Co., St. Louis, Mo., has enlisted in the navy, and L. H. Ware, assistant manager, has been promoted to the management.

C. H. Gamble has been appointed superintendent of the John Deere Plow and Tractor Works, Rock Island, Ill. Mr. Gamble started with the John Deere plow concern in 1906 in the experimental department. He succeeds A. H. Head, who has been called to Washington, D. C., to assist the War Department in the production of airplanes.

B. C. Swinehart is now manager of the motor truck tire department of the Hewitt Rubber Co., Buffalo, N. Y. For the last eight years Mr. Swinehart has been with the Republic Rubber Co., Youngstown, O., and prior to that six years with the Swinehart Tire and Rubber Co., Akron, O.

W. A. Haynes succeeds Major Hawxhurst, who has resigned from the Detroit office of the Westinghouse Electric Co. Mr. Haynes has been appointed manager of the automotive division of the Detroit office of the Westinghouse Electric Co.

C. J. Welsh has been advanced to the post of assistant sales manager of the United States Tire Co. at New York City. He was for five years manager of the truck tire department. Mr. Welsh has built up the company's business on truck tires, handling a great volume of work not only among the trade, but with the government and the automobile manufacturers. He will continue to devote his special attention to the truck tire end of the business, with the aid of C. K. Whidden, who comes from the truck tire department of the company's branch at Philadelphia, where he has been manager.



C. M. White, Sales Manager Firestone Steel Products Co.



Harry B. Warner, Vice President and Production Manager, Federal Motor Truck Co.



Fred C. Sibley, District Sales Manager,
Sanford Motor Truck Co.

C. W. Waughop has joined the whole-sale forces of the Hurlburt Motor Truck Co. to cover Pennsylvania and Ohio territory. He was formerly eastern district manager of the Rainier Motor Corporation, New York City.

E. B. Moon has been appointed sales manager and advertising manager for the Columbus Tractor Co., Columbus, O. He was formerly director of sales of a large wholesale house.

R. C. Getsinger has been elected vice president of the William N. Albee Co., Detroit. He was formerly sales manager of the Saxon Motor Car Corporation, Detroit. James Strasburg, formerly with the American Electrical Heater Co., Detroit, has been appointed sales manager of the Albee company.

A. A. Gloetzner, sales manager of the Covert Gear Co., has received a commission and is on overseas work for the government. His picture appeared in the June issue of the Automobile Journal as "C. T. Chenevert," which error was due to a mistake in identifying his portrait.

P. L. Barter, sales manager for the McCord Manufacturing Co., Detroit, has been promoted to the position of second vice president. He has been with the McCord company since its organization nearly 10 years ago.

Elmer H. Hohental has been appointed manager of the Detroit sales and service branch of the Eisemann Magneto Co. He was formerly associated with the Bosch Magneto Co. and the Simms Magneto Co.

D. N. Mason was elected vice president of the Mason Tire and Rubber Co. at a meeting which was recently held.

B. H. Boensch has been promoted to the management of the New York branch of the Bearings Service Co. Mr. Boensch has been for some time special representative of the concern and has been engaged in appointing distributors. The New York branch is one of the most important chain of 22 operated by the Bearings Service Co.

T. O. Kellogg has been transferred to Madison, Wis., as general manager of the Overland Madison Co., distributor in the state capital territory, embracing all of Southwestern Wisconsin. He was formerly general manager of the Overland Wausau Co., Wausau, Wis.

C. W. Nash, president of the Nash Motors company of Kenosha, Wis., has been appointed assistant to John D. Ryan, director of aircraft production, and will have charge of engineering and production. He is well known throughout the automobile industry and was formerly president of the General Motors Co.

J. A. Scullin is now manager of the Cleveland branch of the Mason Tire and Rubber Co.

H. J. St. Aubin has resigned as traffic manager of the Federal Motor Truck Co., Detroit, to enter government service at Camp Custer, Mich.

L. K. Cooper is now associated with the Chevrolet Motor Co., St. Louis, Mo., as sales manager. Mr. Cooper has been assistant to the sales manager of the Chevrolet Motor Co. of New York.

H. S. Johnson has resigned as western district representative for the automobile department of the Westinghouse Electric and Manufacturing Co., Indianapolis, Ind., to become associated with the Ansted interests, manufacturers of the Lexington car and the Teeter motor. He will be located at the plant of the Teeter-Hartley Motor Co., Hagerstown, Md.

F. A. Mansfield, for 12 years with the Westinghouse Electric and Manufacturing Co., has resigned to become manager of the Pittsburgh office of the Mechanical Appliance Co. of Milwaukee. This is a new company which has recently opened offices in Detroit, Chicago, Minneapolis, Cincinnati, Cleveland and Washington. The company manufactures motors and generators of limited sizes. Mr. Mansfield is well known in the electrical industry, having been connected



A. A. Gloetzner, Sales Manager of Covert
Gear Co., on Overseas Service.



C. W. Nash Will Assist in Aircraft Pro-
duction.

with the export and industrial departments of the Westinghouse company for many years. Prior to his resignation he had been employed on government work.

J. B. Clarkson of the Hope Gibbons Sons and J. B. Clarkson, Ltd., wholesale merchants, Wellington, New Zealand, has returned from England and is now in New York City. On his way back to New Zealand he will visit Australia. He is very much interested in motor car accessories.

H. G. MacEachen, formerly western division advertising manager for the Firestone Tire and Rubber Co. of Akron, O., has entered the veterinary department of the United States Army. Mr. MacEachen has been with the Firestone company since the spring of 1916, when he was appointed assistant western division advertising manager, and later he was promoted to manager.

Theodore H. Harvey has resigned as general manager of the Pelton Steel Co., Milwaukee, Wis., to become general manager of the Ohio Steel Foundry Co., Springfield, O.

Hi Sibley has joined the advertising staff of the Packard Motor Car Co., Detroit. He was former advertising manager of the Republic Motor Truck Co., Inc., Alma, Mich.

R. J. Price has resigned as sales manager for the Highway Tractor Co., Indianapolis, to become zone manager in the southeast for the Heath-Duplex department of the McCord Manufacturing Co., Detroit.

Lawrence Hayes is now factory superintendent and assistant plant manager of the Hess-Pontiac Spring and Axle Co., Pontiac, Mich. He was formerly superintendent of the Standard Parts Co., Cleveland.

J. F. Richman is now associated with the Allen Motor Co., Fostoria, O., as factory manager. He was formerly factory manager of the Cole Motor Car Co., Indianapolis, Ind.

SMALL TRACTORS USEFUL FOR

*In Addition to Performing Practically All
erly Used They Are Utilized as Portable
Road Maintenance*

THERE is no question of the diversified uses that may be made of power on farms; a man of mechanical ideas could undoubtedly do a considerable part of the work that is or has been done manually. But the farmer's work is in different places and for the greater part of it small power units would serve admirably. There are instances where from one to five horsepower would be adequate, and some of the larger operations might be best done with much larger engines, perhaps up to 25 horsepower. The farmer cannot buy engines for every work. Even were electric power available there would not be sufficient use of any one unit to justify buying separate motors, so that at best the farmer can only provide one or two machines—probably one, save in rare instances.

This being so the farmer wants what will be sufficient for field work, and yet can be used with economy of fuel and lubricant and maintenance expense in whatever other work he can do with it. The powerful tractor might save him time while plowing and planting and harvesting, but against this economy would be extravagance of large consumption of fuel and other operating cost if it were used for work where much less power were required. There are numerous uses for which small engines would be preferable, and the greatest convenience would be one permanently located for each machine or purpose. Next to this, with a view of minimizing expense, a single plant that can be moved wherever required is best for general purposes.

There are works where daily use is desirable—perhaps necessary—such as pumping water, driving lighting plants, milking machines, etc., but most farm work is intermittent, depending upon seasons. This applies to power only, but field cultivation is done only part of the year. Tractors can be used for road haulage, but they are not comparable to power trucks save when the movement of loads is comparatively slow. There appears to be no reason, however, why farm work could not be better systematized so that it could be done in such order that machinery could be used more continuously.

But in addition to this there are other objects that should receive consideration. For instance, one man owning a tractor could contract with others to do work for them, to a determined schedule, so that the machine could be used. This would possibly lead to what might be termed community work. Besides this, road work is necessary and this could be done at different times, constructing, grading and repairing in the spring, summer and autumn, and breaking paths through snow in the event of storms. Haulage work with trailers could also be done, and the nature of this would depend largely upon the needs of the community.

What has been stated applies to farm tractors, but if these machines are adapted for road work, that is, by cleating the wheels, they could be used for numerous other work. For instance, trains of heavy trailers could be hauled considerable distance. The time would not be fast as compared with trucks, but the greater capacity of the units would be the material value. Tractors could be utilized by industrial plants, for haulage of units in the yards, taking the place of or serving instead of other power, for



GREAT DIVERSITY OF FARMWORK

the Work For Which Horses Were Former Power Plants and For Haulage Work and Construction

drawing small cars between factory units. They could be worked for switching cars, they could be used for delivering heavy materials or products, and they would serve with power take-off equipment for all purposes for which portable power plants are now regarded as necessary, combining the values of road or track haulage with hoisting, and having the advantage of mobility.

There is a large measure of economy in the combination of power plant and haulage unit from the viewpoint of the road and building contractor. Tractors can be used in a great deal of excavation work, for there are types that can be driven on soft ground without loss of traction. In fact for some works trailers with free revolving tracks instead of wheels are especially suited, and machines of this type can be driven over ground devoid of paths. One of the experimental services of the United States army in Texas proved that tracklaying tractors could haul enormous loads on trailers through desert sand quite as practically as on highways, but wheeled trailers were not as serviceable because of sand surfaces into which the wheels sank.

Slow-moving tractors, with broad wheels or tracks, cannot be objected to by road builders. The distribution of the weight over large surface areas lessens the pressure the square inch to a point where there is consolidation of the road instead of disintegration from the tractive effort upon the roadway. Such wheels do not cause ruts. To the contrary, the use of tractors "irons" the roads and levels the surfaces.

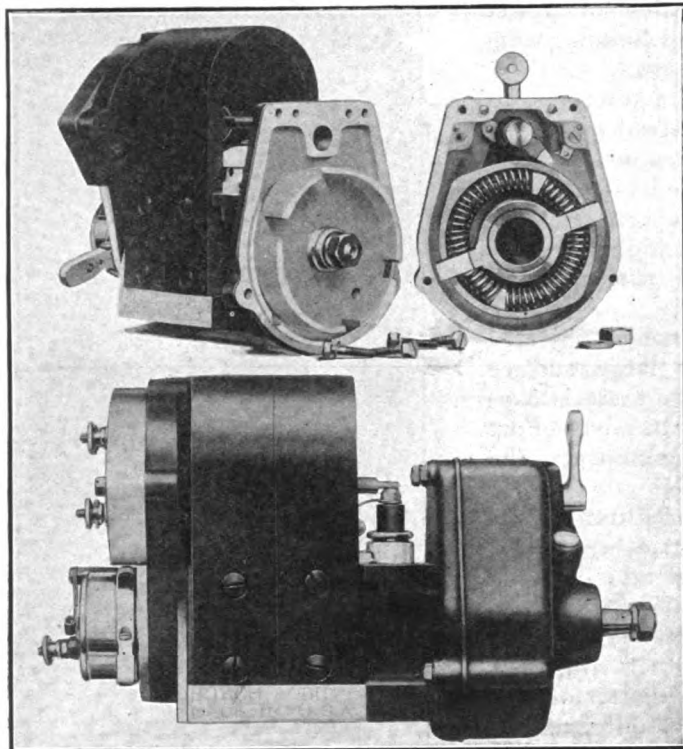
Tractors have been believed generally only suited for agricultural work. As a matter of fact they can be used by innumerable industries, especially with adaptations of tracks and wheels with reference to the type of roads and streets on which they are driven. The fact that their utility is not lessened by the nature of the ground, that they can be worked where power trucks and animal vehicle capacity is much reduced, is another utilitarian value that should be considered by tractor salesmen. As a matter of fact the tractor possibilities are seemingly only limited by the resourcefulness of the owners and operators.

The series of illustrations at either side and the foot of these pages demonstrate varying possibilities in farming operations and industrial work. Beginning at the top of the left page and following around to the top of the right page these show a Cleveland tractor that is successively plowing on a steep grade, disc harrowing, planting, cultivating, peg harrowing, operating manure spreader, cultivating between rows, cutting clover, mowing hay, reaping and binding, sawing wood, hauling a trailer loaded with lumber, breaking a snow path in a road, hauling car on a plant industrial railroad, switching freight cars, drawing a portable power plant for a contracting builder, distributing road material, scarifying a road, scraping a road and pulling a train of trailers for a road builder. So far as the farm work is concerned what are shown are all field operations, and the illustrations of road clearing and construction and industrial plant railroad switching works are but a few instances of what can be done practically with tractors.



New Bosch Magneto Impulse Starter.

The Bosch Magneto Co. is now producing an impulse starter that is designed primarily for use with types DU4 and ZR4 independent Bosch magnetos for four-cylinder engines used for truck and tractor work, but it can be supplied for special orders for use with any standard types of Bosch magnetos for marine, automobile, airplane or stationary engines, or for any other ignition. It is not intended for attachment to any magneto now in use, and is supplied only as a part of new Bosch magnetos.



Bosch DU4 Type Magneto, with Impulse Starter, Showing the Instrument Designed for Easy Truck and Tractor Starting.

The impulse starter is designed to facilitate starting the engine, automatically increasing the speed of the magneto armature with slight turning of the engine shaft at the exact time to fire the cylinders, thus affording full electrical capacity of the magneto at very slow engine speed. In effect it is an auxiliary to the magneto that is interposed between the armature drive and the armature shaft. When the engine is turned the armature is held stationary, and the energy necessary to turn the armature is obtained by compressing a series of helical springs. At the predetermined position the springs are released and the armature is turned at high speed for a part of a revolution. The initial spark having been obtained the engine begins to fire regularly, and when it attains a speed of 120 revolutions a minute the starter is automatically disengaged and the armature drive takes up the work as a flexible coupling.

The construction of the starter is shown in the accompanying illustration.

It is contained in a water and dust tight aluminum housing and it consists essentially of two helical springs carried within a flanged disc. Meshing with the coils of the springs, which are on guides, are the arms of a cross member mounted on a sleeve by which the armature is driven, these arms and the seats against which the ends of the helical springs bear, being seated in the niches in the flange of a disc mounted on the armature shaft. As the driving sleeve is turned the springs are compressed, and when the point of desired compression is reached the compressed springs turn the armature shaft until the limit of expansion is reached. The movement is sufficient to fire an engine and then the starter is nothing more than a flexible coupling. As will be noted the entire movement of the armature before firing is less than a third of a revolution.

The operating parts are all high grade steel and have large factors of safety. The spring action is carefully balanced to impart even torque to the armature, and as the heavier part of the starter is carried on its own sleeve bearing there is no added strain on the magneto bearings. The starter is controlled by a lever mounted on a shaft extending from the front of the housing. The lever is constructed so that it may be operated by hand or connected with controlling linkage. Should the starter be accidentally engaged while

the engine is running it will not be really functioning, and no damage could result. By the use of one oil cup the starter is fully lubricated, oiling being required monthly.

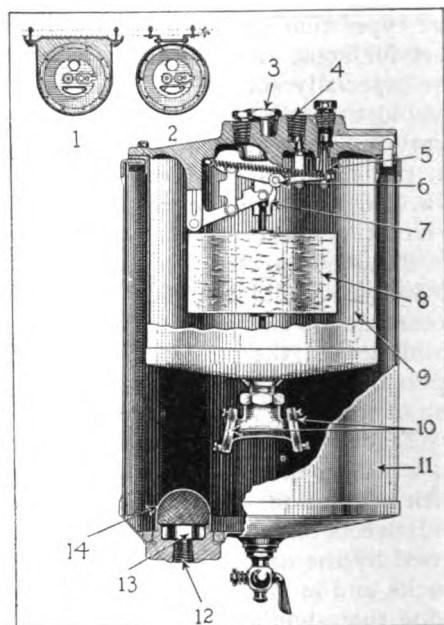
HEAVY DUTY STEWART VACUUM FUEL FEED SYSTEM.

A type of vacuum fuel feed system that is especially designed for use with all heavy duty gasoline engines, for tractors, trucks and stationary power production is now produced commercially by the Stewart-Warner Speedometer Corporation, Chicago. It is known as model 146-A and it is built heavier than any system previously produced. It has largely increased capacity and accelerates the flow of gasoline. It is made in two sizes, one with a round shell having 3½ pints capacity, and one with a D-shape shell having five pints capacity.

One of the features is that it has a flapper check valve in the gasoline line

at the top of the tank, which prevents the gasoline receding when the suction ceases. This keeps the gasoline line full, so that the instant the float chamber is emptied the filling is begun automatically. The air vent is a venturi type, which insures instant action and rapid emptying of the inner chamber into the lower chamber. The inner chamber has a double flapper valve, which allows it to be emptied in half the time that would be required with a single valve.

The float is of cork, heavily coated with Acco, so that it cannot become saturated with gasoline. There is a removable strainer in the gasoline outlet to the carburetor that filters the fuel and insures its purity. The tank is fitted with a petcock with which gasoline may be drawn for priming or other use, or water may be drained. The capacity of the system is 20 gallons an hour at two



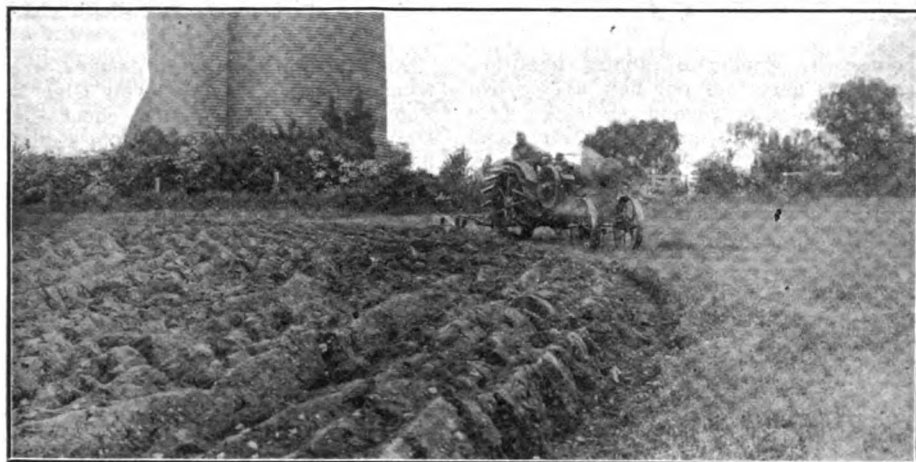
Stewart Vacuum Heavy Fuel Feed for Trucks and Tractors: 1, D-Shape Reserve Tank, Capacity Five Pints; 2, Round Reserve Tank, Capacity 3½ Pints; 3, Gasoline Inlet; 4, Vacuum Line; 5, Venturi Type Air Relief Valve; 6, Nickel Pins; 7, Flapper Check Valve; 8, Cork Float; 9, Large Capacity Inner Chamber, Capacity 30 Gallons an Hour at Five Pounds Vacuum and 20 Gallons an Hour at Two Pounds Vacuum; 10, Double Flapper Valve; 11, D or Round Shape Reserve Tank; 12, Outlet to Carburetor; 13, Sediment Trap; 14, Gasoline Trap Strainer, Removable with Trap.

pounds vacuum and 30 gallons an hour at five pounds vacuum. At either of these the system will supply a much greater volume of fuel than could possibly be consumed.

PURITAN BUYS SERVICE PARTS BUSINESS OF ARGO ELECTRIC CO.

The Puritan Machine Co., Lafayette boulevard and 10th street Detroit, has added another "orphan" to its list, having purchased the service repair parts business of the Argo Electric Co., formerly of Saginaw, Mich. The entire stock of Argo repair parts has been removed to Detroit.

Digging Trenches To Feed The Liberty Army

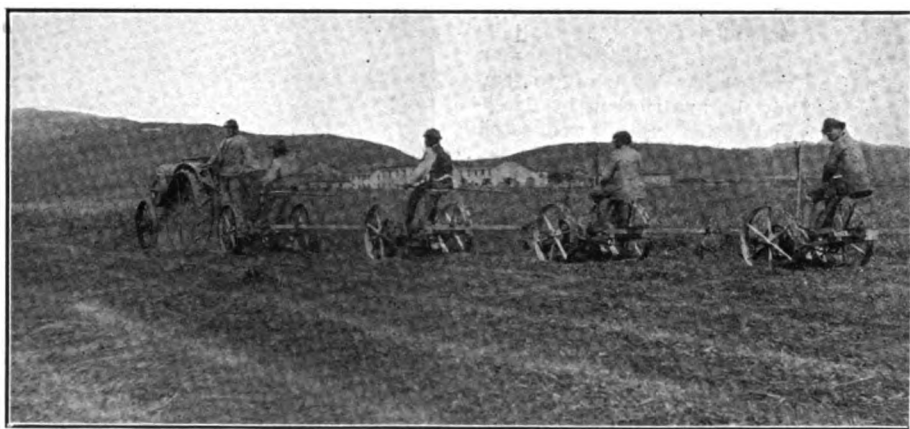
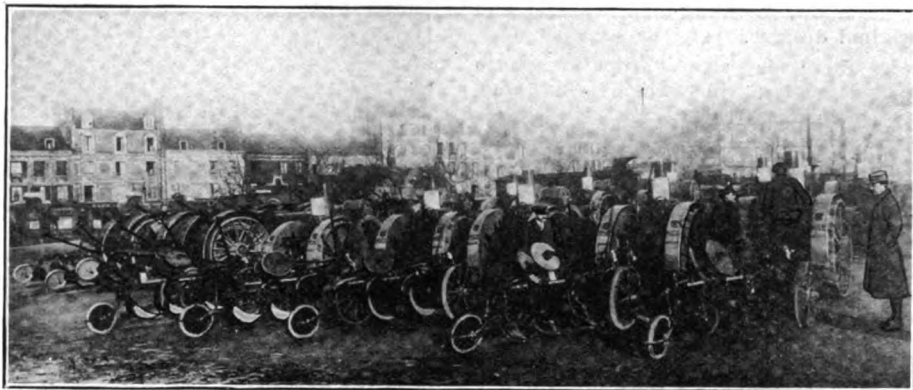


At Left: Plowing with a Titan 10-20 Tractor at Dreamwold, the Magnificent Country Home of Thomas F. Lawson at Egypt, a Village in the Town of Scituate, Mass., an Estate Famed for Its Blooded Stock and Intensive Farming.

Below: Mogul 10-20 Tractors, Shipped Knocked Down to Havre, France, for the French Government, Assembled and Ready for Distribution. About 1500 Tractors Plowed 500,000 Acres in France This Spring and Will Plow 1,000,000 Acres This Autumn, Making Productive About 15 Per Cent. of the Acreage Uncultivated Because of War.



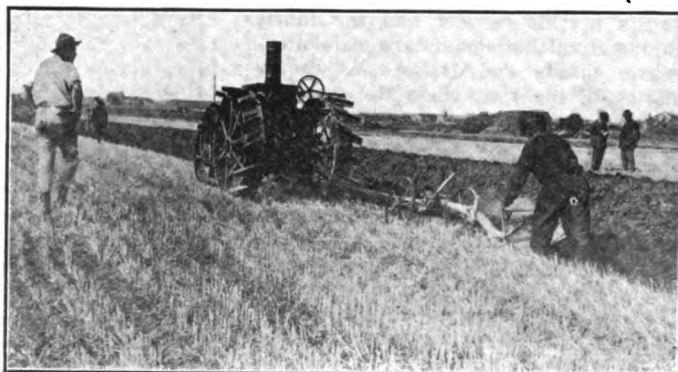
Miss Mayette Pierce, Leola, S. D., One of Three Daughters of a Large Farm Owner, the Only Woman of 330 Students at a Tractor School at Aberdeen, Whose Skill Driving a Machine Was Such She Was Asked to Operate One During a Demonstration and Later Operated Her Father's 10-20 Mogul the Entire Threshing Season.



Reaping the 1918 Hay Harvest at Grosseto, Italy, with a Titan 10-20 Tractor.



When Gorizia Was Captured by the Italian Army Grain Threshing Was Begun with Mogul 10-20 Tractors, Two Machines Driving a Wooden Thresher, in Variance to the American Type of Thresher and Use of Power.



Plowing in Italy, Showing the Deep Furrow in Which the Plowman Walks, the Driver Walking Beside the Mogul 10-20 Tractor, the Guiding Mechanism Doing the Driving Until the End of the Field Is Reached, He Only Turning the Machine.

Automobile Apparel Appropriate for Autumn

War-Time Silhouettes for Motor Women

By MRS. A. SHERMAN HITCHCOCK.

FREEDOM of choice and a wide variety of ideas, born of that necessity which mothers the cleverest inventions, is a notable feature of this season's modes for Milady Mobile. Against a background of more sombre coats and capes the flower-like gayety of the new frocks, hats and sweaters makes a wonderful show, revealing many striking and original designs.

If there is any particular phase of costuming in which the motor woman takes delight it is her wardrobe. She has long since learned the art of combining beauty with utility, and her motor togs present an element of smartness equal to that of the dressiest costume in her wardrobe. Fortunately, we are past the experimental stage in this matter of our attire, and while some women continue to wear unbecoming motor coats and headwear, there is really no good reason for such a condition save bad taste or indifference.

Interesting indeed are the lovely new motor fashions. Since the necessities of war have demanded that wool shall be devoted almost exclusively to the man behind the gun, it has been left to femininity to show her patriotism by dressing in silks and satins. She is requested—indeed practically ordered to do so. And since materials of any sort must be employed with the strictest economy, the motorist of 1918 is swathing her supple figure with remarkably few yards of silk, satin or cotton fabric, and thereby achieving a sinuous simplicity that is both charming and patriotic.

No true daughter of Eve will admit that any hardships have been wrought by these war-time regulations, for never were both silks and cottons lovelier than they are today. Our American manufacturers have indeed achieved wonderful results in this respect and the fabrics coming from their looms are exquisite in weave, quality and design. At the beginning of the war, when the supply of German dyes was cut off, we were threatened with an end to all our colored fabrics, but American dyes are found to be fully the equal of the German product, not only in beauty, but also in durability.

At this season of the year there is no more popular frock for motoring wear than that of gingham. Cool and comfortable, soft and fine in texture, and beautiful in design and coloring, it is essentially a most practical material for the sport. One of its best attributes is, of

course, its wonderful tubbing qualities, and it is here that our new dyes prove themselves to be beyond reproach. This cannot be said, of course, of all ginghams on the market, but the motorist possesses both intelligence and discrimination and will select a standard material which is produced by a reliable manufacturer.



For warm weather motoring nothing can be smarter or more comfortable than the cape of pongee. Made in the natural colored pongee, this model has the deep yoke back with straight front, soft roll adjustable collar which buttons through arm slits from the yoke forming half sleeve, or worn as full circular cape. Buttons are of pearl.
(Courtesy Franklin Simon & Co., New York City.)

Among the very new designs, fresh from the looms, in the lovely Glen Roy Zephyrs, are many plaids, checks and stripes. While there are some stunning dark colors in blues and greens, with touches of color introduced in their stripings, the majority of those brought to my attention are light shades. The checks are of different sizes, varying from those about an inch square, or a trifle more, down to pin checks. In some of the blue and white plaids, a stripe of tan or brown is put in occasionally, making a really beautiful combination. There are lovely pinks, greens, yellows and blues seen in the most artistic combinations. Green and brown plaid is one of the season's popular combinations. One plaid showing yellow, green, blue and black is very stunning, while another that especially deserves mention is of blue, brown and white. In the stripes there are some particularly delectable patterns. One shows stripings of pink, green, yellow and white; another is of blue, yellow, green and white, and a third is of green, blue, yellow, red, black and white. In each instance the colorings are soft and subdued and blend most harmoniously. There are some stunning black and white checks and plaids and stripes and in the plain shades are blues, pinks, lavender, greens, browns and yellows. Never has any material of this character equaled this season's production and the fact is quite convincing that when America is obliged to do a thing it is entirely equal to the task.

A smart motor frock in Glen Roy Zephyr is in a large brown and blue plaid. It has a turned up tunic, forming two large pockets buttoned at each side and the blouse is in bib effect. A frock of soft dull green Glen Roy is serenely, confidently cool for summer motoring. With its white linen collar and cuffs it possesses just the effect that a smart little breeze has in a calm. A girdle, characteristically enough, is a mere cord, and single, large pleats are introduced at either side of the skirt section for the sake of ease and chic. A black and white check is combined with white organdie and is made straight and slightly full and a black satin ribbon ties about the waist, with streamers. A pale pink has a surplice blouse edged in white wool embroidery and fastened at the side with three little pearl buckles and loops. The skirt section is draped in peg top outline with a pleated peplum at the back. There is a great deal of smart style in this frock for a small price.

One of our most clever designers and fashion leaders has brought forth the most practical and attractive dress for the motorist under the name of "Co-Ed." She has appreciated, with wonderful understanding, the especial features so necessary to correct motoring garb and combined with ingenuity and skill, making the result one which will be recognized and appreciated by the discriminating motorist. The model in navy blue

serge herewith shown is so good looking that to see it is to want it. There are many other charming designs in the Co-Ed dresses, of which I will tell you later.

In practical and attractive motor millinery models I am bringing two very smart ones to your notice. Both are built of dark blue Georgette crepe and are the Gage models, something especially appealing to the knowing motorist. One of the models is trimmed solely with a drape, gracefully put on and edged with silk fringe. The other model has a white edge veiled with navy silk fringe. A veil of the navy Georgette, edged with navy silk fringe and a trimming of blue wooden beads, complete the smart effect.

A motor hat copied after the Royal Flying Corps is one of the most popular models of the present. They are reproduced in the military khaki color, and also in many other new and attractive

shades. The necessary motoring veil has been added and gives both charm, distinction and serviceability. Calico and gingham motor hats are to be seen everywhere and particularly at the country resorts. The Blue Devil tams, Red Cross turbans, and the very smart roll shape that the Anzacs wear, are among the very popular motor millinery.

The picturesque cape has invaded motor land and has proven itself a thoroughly serviceable and comfortable garment for the feminine occupant of the car. Especially is it liked to throw over the frock or suit when the air becomes a little cooler and additional warmth is needed. Many charming models have the mandarin or graceful side drapes and well linked materials are tricotine, men's wear serge, Poiré twill and the fashionable soft wool Worumbo's. Silk lined in self or contrasting colors, they may be had in standard and the season's leading shades and in prices varying according



The motor coat of wool is always a necessity in the wardrobe of the motor woman and never more so than during the touring season. The newest and most desirable features are in evidence in this Printzess model and the collar of silk adds a touch of dressiness and attractiveness. (Courtesy Printz-Biederman Co., Cleveland, O.)



Nothing can exceed this smart motoring model in attractiveness and good taste. Made of navy blue Georgette and trimmed with navy blue silk fringe, it is becoming, practical and thoroughly up-to-date. Its trimming of fringe places it among the leaders in advance mode. (Courtesy Gage Brothers & Co., Chicago, Ill.)

to the buyer's purse and taste. A charming motor cape is made of navy blue Kashmir with an unusual and novel dual draping. By being drawn to the shoulders with long, graceful folds, fastening on the right shoulder, the cavalier influence is noted; yet by the manner of crossing and an irregular cut at the bottom an envelope tunic effect is devised. Added to these features are tight sleeves set in wide arm holes, if they may be called that, since they reach to the elbows and are part of the drape, and a triple fold draped collar, which encircles yet does not touch the throat. A stunning cape is made of Hilendale, which has a yellow and black checker board plaid. It is a wonderful material, soft and light as down and will stand the hardest kind of wear. The lining is of

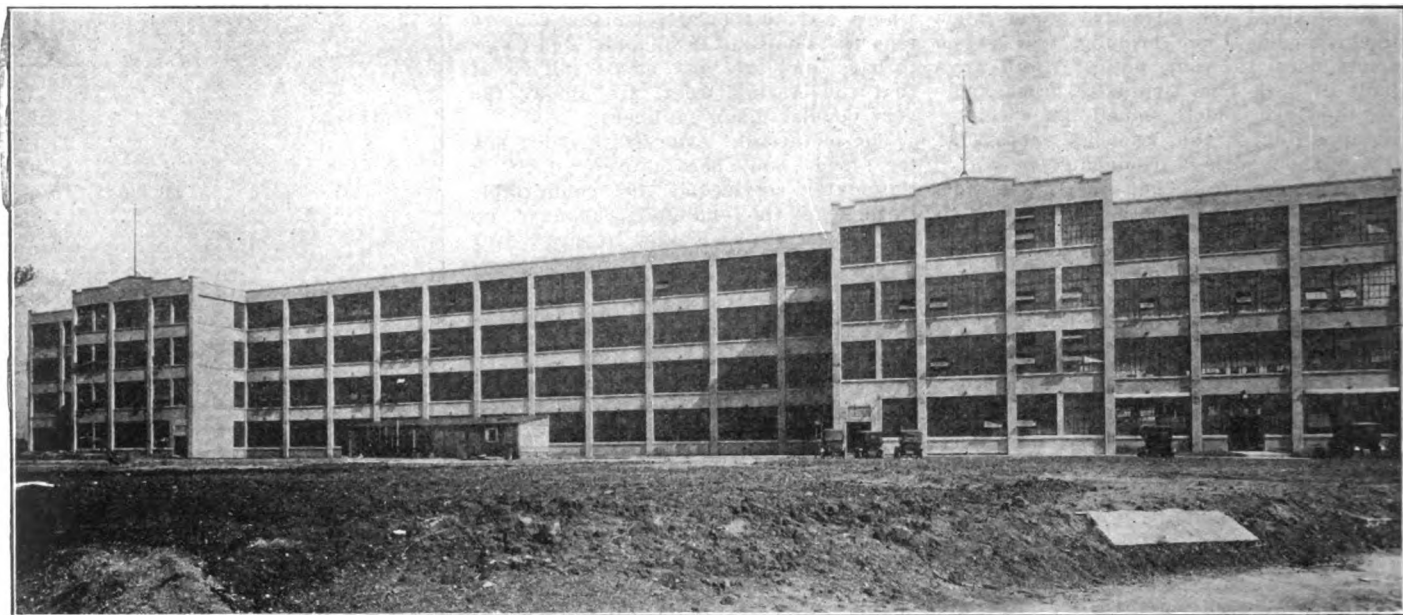


To be absolutely up to the minute the motor woman must wear one of the picturesque new capes. This model combines the very fashionable sleeveless sport jacket and cape which is detachable. It is of duvetyn wool velour. The long cape is attached and detached at will and is distinctly individual with its draped hood collar and shorter length cavalier cape. (Courtesy Franklin Simon & Co., New York City.)

yellow satin and a round hood gathered on elastic and lined with the satin, which is ruched at the edge. This fastens with two buttons in the shape of yellow and black parrots.

Some of the most charming capes of the season are made of the durable Moneybak taffeta. This taffeta comes in all the dark shades and in many of the lighter ones. Some very smart colors are roseate, wireless, ciel, wistaria and beige. This taffeta is also being used to a great extent for frocks, coats, hats and millinery. It is most practical and possesses wearing qualities not usually found in any silken fabric.

DIAMOND CHAIN AND MFG. CO'S PLANT



The Front Exterior of the New Plant of the Diamond Chain and Manufacturing Co., Indianapolis, Ind., 480 Feet Long and 60 Feet Wide, of Brick, Steel and Concrete.

IT HAS been a long step from the advent of the bicycle to the tremendous success of the motor truck and tractor, but the Diamond Chain and Manufacturing Co. of Indianapolis, Ind., has also grown and developed with the industry.

Back in 1890 this concern began the manufacture of roller chain for the transmission of power. Now its product is known in every village in the United States and in every foreign country. Like many other lasting successes the Diamond Chain and Manufacturing Co. has not had a mushroom growth. Its production has gradually grown, always just a step ahead, until it is now one of

the real successes in the motor truck and tractor accessory business.

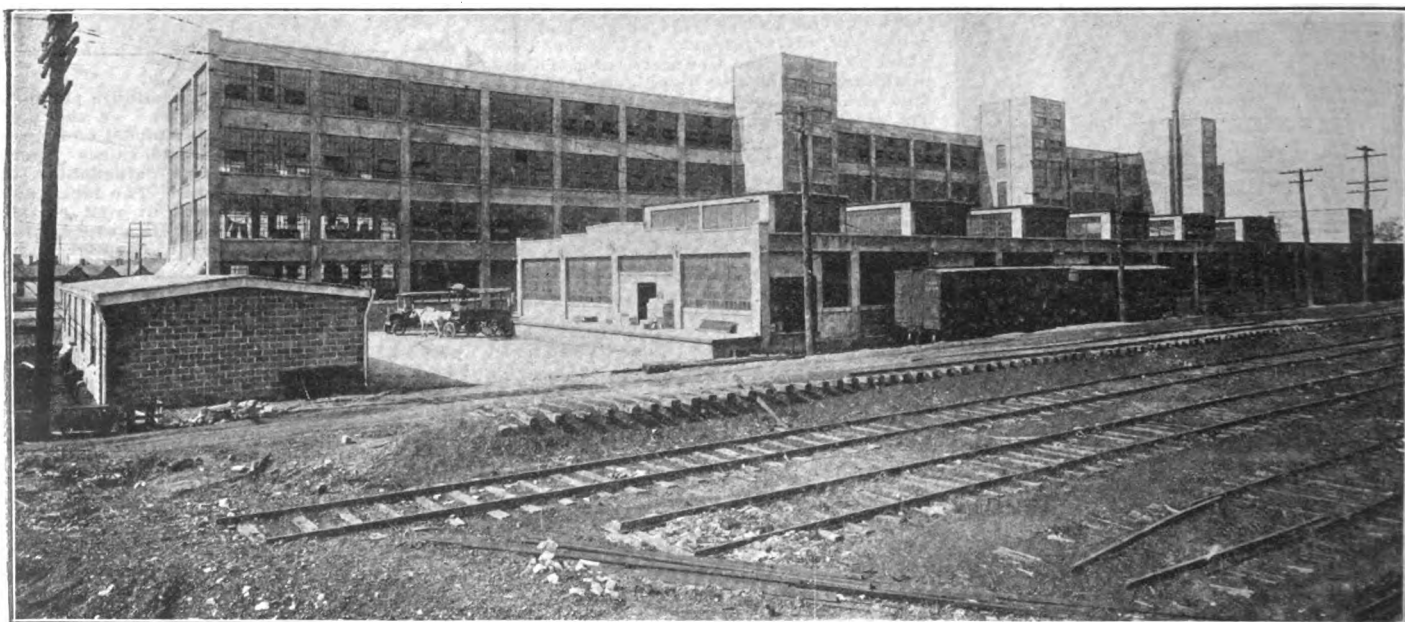
The Diamond Chain and Manufacturing Co. does not feel that it "has arrived"—there is always room to grow and to improve. That it has grasped these opportunities and that it has made the most of them by always keeping its product at the ultimate in perfection is a well known fact among the trade.

Care Given to Manufacture.

Few know about the out-of-the-ordinary care and attention given to the manufacture of Diamond truck and tractor chain and it is impossible to do justice in this small space to so interesting a subject. The photographs from which

the accompanying illustrations are produced will give some idea of the proportions of the new factory into which the company has just moved.

Perhaps no product is manufactured under more ideal conditions. Certainly no higher manufacturing standard is in effect from the moment the raw steel is received until the finished chain has been given its final inspection. Every link, side bar, rivet and roller is minutely examined—then if up to the "Diamond" standard of quality it is passed. After this the links are assembled by special automatic machinery into chains of varying length. The finish chain is again carefully inspected—tested for



Rear of the Main Building of the Diamond Chain and Manufacturing Co., Showing the Railroad Siding Beside the Storehouse and Shipping Department.



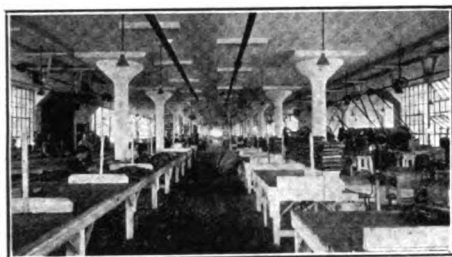
View of the General Offices (In the Background) and the Order Department (In the Foreground).

strength. If the completed chain equals the strict requirements established it is then ready for service.

Plant on Six-Acre Site.

The location of the Diamond Chain and Manufacturing Co. is at the corner of Kentucky avenue and West street, standing on a site of six acres, five blocks from the center of the business district, commonly referred to as the shopping center.

Illustration No. 3 shows a view of the offices of the department heads of the



Part of the Assembly Room, on the Fourth Floor, Where the Chain Is Finished.

company, the foreground being a view of the order department. Orders are promptly entered here and delivered to the shipping department. The stock room shown in illustration No. 5 is located in the one-story building adjoining the main plant. Parts, such as rivets, rollers, side bars, etc., are case hardened in the hardening division shown in illustration No. 6. Here is where the wear is built into the finished chain, enabling it to give the long life and greater service for which "Diamond" chain is noted.

The blank parts after leaving the hardening room are then sent to the various departments, where the side plates are punched, the parts assembled. Then the links are ready for assembly into the finished chain, the rivets being spun by automatic machinery.

Plant Employees Number 1000.

To produce the millions of feet of "Diamond" truck and tractor chain demanded each year by the trade, about 1000 people are employed. To properly house this vast number of employees

under proper working conditions, to furnish them with a cooperative grocery store where they may purchase their provisions at cost, to provide the spacious lunch room and kitchen where hot meals are served each noon, to contain the welfare offices, with a hospital, library, rest room, etc., the mammoth factory shown in illustration Nos. 1 and 2 is needed. The main building is four stories high, 60 by 460 feet, and the one-story structure is 80 by 300 feet.

The building is supplied with many stairways, elevators, locker rooms, shower bath, etc.—every known convenience for the comfort and convenience of its army of faithful employees is provided by the company.

Aside from the pride in the product and the constant aim to keep it at the ultimate in perfection, the Diamond Chain and Manufacturing Co. is rightly proud of the splendid showing it has made in the Liberty Loan, Red Cross, Y. M. C. A. and other war fund campaigns.

This story will better acquaint you with the product and policies of the

Diamond Chain and Manufacturing Co.—will show you the methods which have enabled it, through conscientious devotion to a single product, a single policy and a single high quality to spring as from the little acorn to the mighty oak. It is their ambition that by means of the quality of their product and service they will continue to deserve their place in the sun—fit to participate in the enormous growth of the truck and tractor industry.

NOBLE MOTOR TRUCK PLANS.

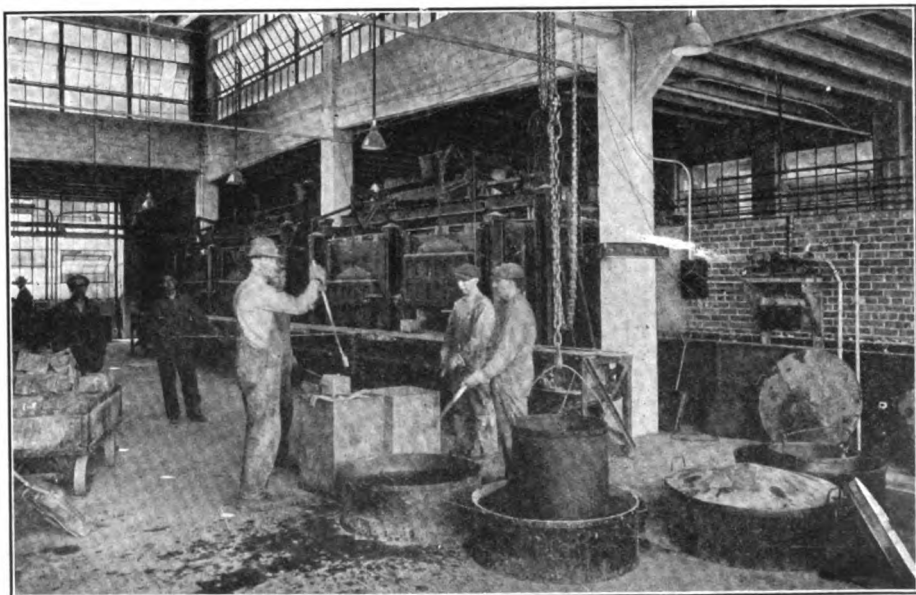
The Noble Motor Truck Co., Kendallville, Ind., has developed plans for factory facilities and production that are essential to the general scheme of expansion, and unless obstacles not anticipat-



The Raw Stock Room, from Which All Material Is Requisitioned.

ed are met the concern will be located in its new plant before cold weather. Plans for a building 192 by 100 feet, having 19,200 square feet of floor space, have been determined and specifications are being prepared for contractors' bids. This factory will be equipped with every facility for efficient and economical manufacturing.

The company is now building a 2½-ton truck that is sold for \$2675, and it is developing 1½-ton and four-ton chassis, which will be produced commercially in a very short time.



Section of the Hardening Department, Where the Rivets, Rollers and Side Bars of Chain Are Heat Treated.

"Stitch in Time" Saves Tires

Blowouts Can Be Practically Eliminated By Sealing Cuts and Pockets When Small

The untimely end of nine tires out of 10 can be traced to the point where a brief application of the "stitch in time" principle would have added thousands of miles to their lives.

A tire manufacturer recently featured the results of tests of nine tires which were run under similar conditions until they failed. Great stress was laid upon the fact that the average life of these nine tires was 6500 miles.

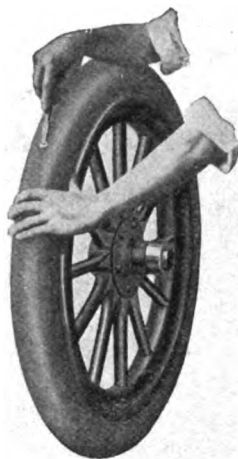
However, two of these tires averaged 9500 miles each. The remaining seven averaged only a little more than 5000 miles. Every one of the seven blew out within 1200 miles after being cut super-

ficially by sharp stones, or glass, so that the fabric was exposed to the action of sand and water. The first two tires ran until they were actually worn out. The other seven would have given double mileage if the small, apparently insignificant cuts had been sealed in time.

Little casing cuts neglected are the cause of more premature tire failure than any other single item. These small holes expose the fabric. Sand blisters form. Water and dirt get in and rot the fabric. Then comes the blow out, a big repair bill and a casing and tube ruined.

Blow outs can practically be eliminated by sealing casing cuts and sand pockets while they are small. The portable vulcanizer does this in a few minutes while the tire is inflated on the wheel. There is no danger to tire or tube and the repair is permanent. Many thousands of automobile owners are in these days of conservation giving their tires a careful inspection every week or two and vulcanizing each little cut that exposes the fabric, with the result that they are now getting double or treble the usual mileage, to say nothing of eliminating most of the trouble they used to have. Of course tubes are repaired, too, with the same vulcanizer and thereby auto owners comply with the request of the war economy board that automobile owners assist in releasing garage mechanics by taking care of as many of their own minor repairs as possible.

Vulcanizing has been accepted as the only method of making permanent re-



Fill the Hole With Raw Rubber.

pairs to tubes and casings. The vulcanizing apparatus has been simplified to the point where the average motorist can use it. To motorists who are considering the purchase of tire repair kits we would suggest that it is well to keep in mind the fact that casings cost several times as much as tubes, and that when purchasing the vulcanizer that will eventually be a part of their equipment they assure themselves that it will repair casings as well as tubes.

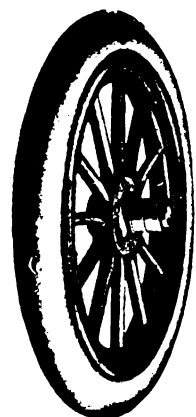
BEARINGS SERVICE TAKES ON RIMS.

R. S. Lane, president of the Bearings Service Co., has announced that his concern has made all preparations to offer to the motoring public a complete service on rims. This announcement further states that this new rim service will be added to the work at each of the 22 service branches of the Bearings Service Co.

"For some time we have realized the



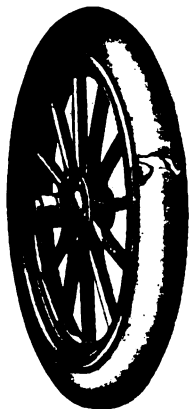
President R. S. Lane of the Bearings Service Company.



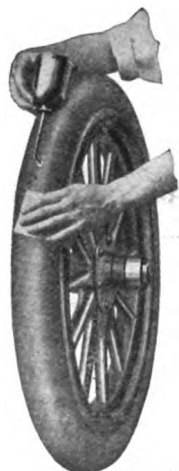
Left—Tire with Small Tread Cut. Too Small to Take to the Repair Shop, but Large Enough to Admit Dirt, Water, Oil, Etc.



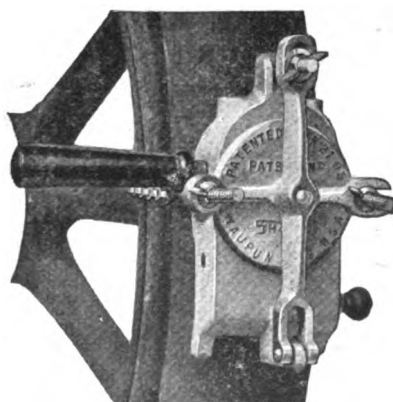
Right—Same Tire After Running a Few Hundred Miles. A Sand Pocket Has Formed and Is Growing Rapidly. The Fabric Which Constitutes the Strength of the Tire Is Beginning to Rot.



Left—A Few Hundred Miles More and There Is a Blowout. Thirty Dollar Casing and Four Dollar Tube Gone.



Right—First Stage in a Simple Repair That Would Have Saved the Tire. Clean the Hole with Gasoline and Sandpaper.



Apply the Vul-Kit for About 20 Minutes with the Tire Fully Inflated on the Wheel. It Gives Just the Right Amount of Heat and Then Quits Automatically. Run Five Miles and You Can't Find the Repair—It Is Welded to the Tire.

need for a nationalized service on rims," said Mr. Lane, "and our organization for service on Timken, Hyatt and New Departure bearings is working so well and has created such a splendid impression on the public that we feel capable of handling the rim proposition properly.

"We have made plans to handle all replacement work on Baker, Detroit, Perlman and all similar types of rims. This includes practically all cars made, at least such a large majority that our organization will find a very heavy task on its hands.

"The rim service will be almost identical with that now being given on bearings. We will have our men thoroughly trained on rim equipment, and maintain a complete stock of the various sizes and styles of rims at each branch. The owners, garage men and dealers will be able to get the rims they need without delay or inconvenience. Although there has never been any attempt made to nationalize

rim service, yet we believe that it can be done. In addition to our 22 branches we also have 500 distributors handling our bearing service, all of which will be utilized in the rim service."

CASSIDY CO. BECOMES SALES DEPARTMENT FOR ECCOLENE.

The Eccolene Co. of Detroit announces that arrangements have been concluded whereby the Edward A. Cassidy Co., New York City, will act as their sales department hereafter, having entire charge of the selling and advertising of Eccolene throughout the world.

Eccolene is the product which has startled some of our most prominent automobile engineers by the marvelous results it has given under every test it has been put to when used in treating present day gasoline. It has proven conclusively to practically eliminate carbon deposit entirely, a better performing motor and a decided increase in mileage per gallon of gas, and it unquestionably is one of the greatest discoveries given by science to the automobile up to the present time.

Eccolene is a product compounded from seven oils and when added to gasoline in a proportion of one to two ounces to five gallons of gasoline, according to the size of the motor, by chemical action it breaks up the gasoline coming through the carburetor and so transforms it that almost every atom will be burned. The result is practically perfect combustion; there is no waste or residue. Maximum efficiency is obtained from every ounce of gasoline used and the motor performance shows almost immediate improvement.

Eccolene is positively non-volatile; it is in itself non-explosive and in no way compares to ether or picric acid. Eccolene simply acts as a vitalizer in the gasoline by making it completely combustible, and it is absolutely non-injurious to any motor.

The Cassidy company has put Eccolene to exhaustive tests before entering into their present arrangements with the manufacturers. It is stated that Ralph De Palma, the speed king, used Eccolene treated gasoline in the Memorial Day race, which he won at Sheephead Bay, New York, as well as at the recent Cincinnati race, which he won.

The Cassidy company now acts as the sales department for some of the largest manufacturers of equipment, which include the Corning Glass Works, Rajah Spark Plug Co., the G. Piel Co., West Side Foundry Co. and F. W. Mann Co.

Eccolene will be marketed under the standard sales policy of the Cassidy company, which means that it will be sold exclusively through the jobbing trade to the dealer and dealer to consumer.

There is now in preparation an extensive advertising campaign, national in scope, which combined with the progressive sales methods of the Cassidy company will make Eccolene a standard product known and used throughout the United States.

Illuminating Gas for Motor Car Fuel

Many Interesting Points Concerning Its Extensive Use in England Reported by Consul.

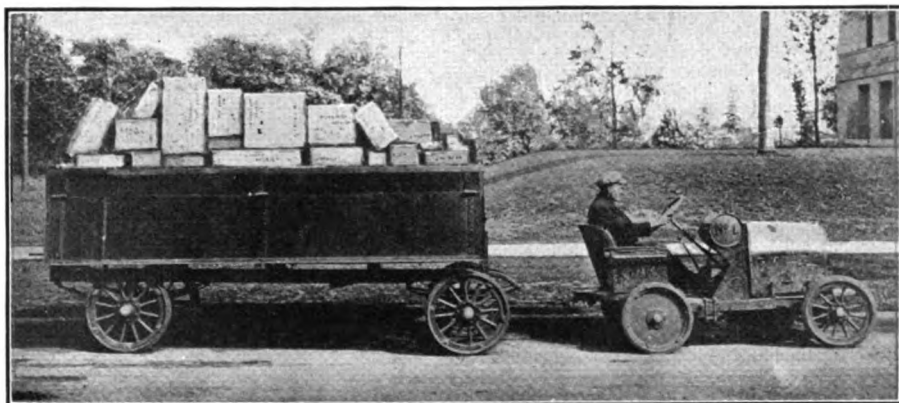
While there is little immediate prospect of American motorists being obliged to use illuminating gas to propel their motor cars, the fact that English people have been doing so on an extensive scale makes the subject very interesting and in response to an inquiry as to how the gas is utilized, Consul E. Haldeman Denison, stationed at Birmingham, England, has made a report, which is published in "Commerce Reports," issued by the Bureau of Foreign and Domestic Commerce. The report is as follows:

"An inquiry has been received at this consulate for particulars as to use of flexible gas bags on motor cars in Great Britain, and the following information on the subject is taken from the interim report of the committee appointed last November to consider the employment of

rics, should at present be allowed to be charged with gas to a pressure exceeding 90 pounds per square inch, or should be of a larger internal diameter than four inches, and even with these limitations such containers, in the opinion of the committee, are unsafe unless properly armored with galvanized steel wire of 0.012-inch diameter. (No. 30 B. W. G.)

"Encouragement, however, should be given to the construction and use of semi-rigid containers of rubber and woven wire up to a working pressure of 300 pounds per square inch. It is also pronounced desirable to encourage a limited number of experiments on a commercial scale with compressed gas in rigid metal cylinders, plain or wire wound, at pressure up to at least 1800 pounds.

"The committee desires authority to have investigations carried on by an expert subcommittee in connection with portable gas generating plants, the commercial use of gas for traction purposes in containers at high pressure, questions relating to liquefaction, absorption and enrichment, and the improvement of methods for insuring the mixture of gas and air in proper proportions. The re-



The "Overland Mule" Hauling Trailers at the Willys-Overland Co.'s Plant.

coal gas as a source of power, particularly in motor vehicles.

"The committee expresses the view that ordinary town gas can be effectively, safely and promptly substituted for motor spirit in engines of the kind usually fitted to motor vehicles, without reduction in the compression space of the cylinder. A mean consumption of 250 cubic feet of gas, having a gross calorific value of 490-500 B. t. u., is accepted as the equivalent of one gallon of motor spirit. An appendix to the report gives a specification for the fabric which should be employed for flexible containers, and it is stated that the normal working life of such containers may be considered as being about eight months, though this period may probably be increased by as much as 50 per cent. if the fabric is continuously protected from the action of light by a suitable covering. The leakage of gas due to the porosity of inferior fabrics may after one month of use equal the actual gas consumption. It is declared to be undesirable that semi-rigid containers of rubber and canvas, and other proofed fabric also contains some recommenda-

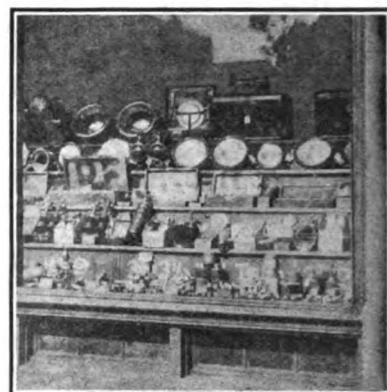
tions as to the conditions of supply of gas to consumers, and the methods of attaching flexible containers to vehicles. It is proposed that the gas inlet to the container on any vehicle in general use should be of iron gas pipe of 2½-inch bore, screwed externally with the British standard pipe thread to take a union for that size of pipe, and such union should be fitted permanently to the end of the flexible tube or other connecting pipe through which the gas is passed from the source of supply."

INTERFACTORY HAULAGE.

The plant of the Willys-Overland Co. at Toledo, O., has 115 acres of floor space and supplies of all kinds must be distributed to the various departments from the store houses, and products moved from one shop to another, which requires trucking operations on a large scale. A factory genius conceived the idea of a small tractor for hauling trains of trailers that has been termed the "Overland Mule." The machine consists essentially of an Overland passenger car engine mounted in a short, heavy frame.



Accessories Department



Midway Floor Board Holder is a device for holding the floor boards in place, so that they cannot slip down nor sideways, thereby interfering with the operation of the foot pedals, thus preventing perhaps a serious accident. With the device attached the boards can be removed as easily as before and when in place the device prevents any displacement.

Manufactured by the **Midway Mechanical Co.**, 1555 Selby Ave., St. Paul, Minn. Price, 25 cents each.

The **U. S. Safety Lock** gives one the modern method for locking the Ford car to prevent it from being stolen. It is new in principle and the Yale tumbler lock of the latest design is used, which absolutely does away with key trouble. By removing the Yale key the car is locked and the steering wheel spins free, no lifting or pulling is necessary to bring this about and the device can be installed in 10 minutes with ordinary tools by anyone. This lock is the only one on the market which will not show play or lost motion after being in service for any length of time.

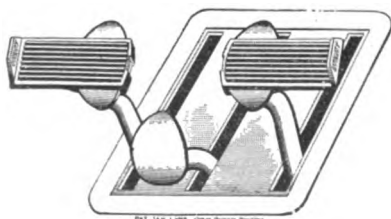
Manufactured by the **U. S. Auto Lock Co.**, 3845 Wabash Ave., Chicago, Ill. Price, \$7.50.

The **Autophone** being a telephone and not a microphone, differs vastly from other instruments used for similar purposes. It will catch every tone variation and reproduces the natural voice vastly intensified, at the same time excluding other noises. It acts the same whether the car is open or closed. The entire equipment consists of a tiny receiver, a small sized transmitter and a few feet of wire. It is readily connected with the other electrical equipment of the car, or with any six or 12-volt storage battery.

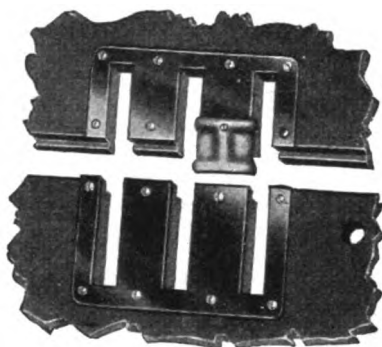
Marketed by the **Klaxon Co.**, Motor Equipment Division, 3066 W. Grand Blvd., Detroit, Mich. Write for prices and literature.

Utility Sure Grip Pedals for Fords are made of pressed steel finished in black enamel and are equipped with heavy pads of rubber edged with metal. They are easily and instantly attached without the use of drilling tools, the tightening of a nut being all that is necessary to hold them securely in place.

Manufactured by the **Hill Pump Valve Co.**, Archer Ave. and Canal Sts., Chicago, Ill. Price \$1 per pair.



Utility Sure Grip Pedals for Fords.



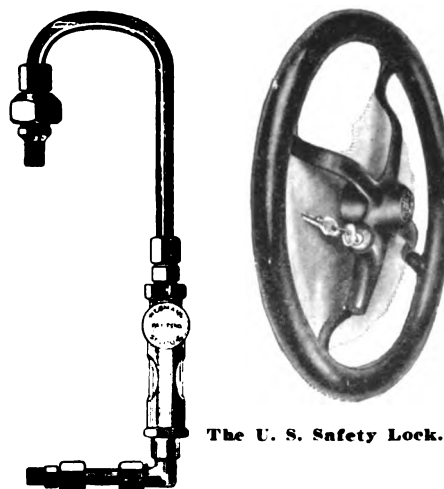
Midway Floor Board Holder.



Braender Tires.



Sunderland Pump.



The U. S. Safety Lock.

The Wegmann Decarbonizer.

The **Wegmann Decarbonizer** is easily installed. It attaches to the intake manifold and to the water supply pipe or jacket. The fine spray of live steam it injects into the combustion chamber acts as a carbon remover and the manufacturers claim its use gives from 10 to 20 per cent. more power. It is regulated by the speed of the engine and once attached and adjusted is automatic in action.

Distributed by the **Manufacturers' Distributing Co., Inc.**, Dept. B, Fullerton Bldg., St. Louis, Mo. Price \$5.

The **Sunderland Pump** is long, smooth working and slender. The single cylinder model, see illustration, has a 24-inch stroke, enabling a frail woman to put 90 pounds pressure into a tire. It is guaranteed for five years.

Manufactured by the **Sunderland Manufacturing Co.**, 600 W. 22nd St., Chicago, Ill. Five models—No. 10 at \$2.25 is a new pump with floating piston. No. 100 at \$1.40 is a single cylinder pump. No. 2 for fast action a two-cylinder pump with 17-inch stroke is \$2.35. No. 3, three-cylinder, has 18-inch stroke, \$4.50.

Braender Tires have been manufactured for six years. The process of manufacture is the wrapped tread single cure process, which means that the tires are cured or vulcanized at one time in one heat, being wrapped in cloth. One of the strong claims is that they are cured in live steam, which leaves the natural oil in the fabric and gives the tires long life. An even pressure is secured at every point, assuring perfect adhesion and vulcanizing.

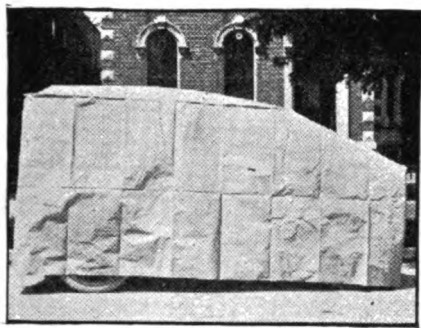
Manufactured by the **Braender Rubber and Tire Co.**, Chicago, Ill. Write for prices and literature.

The **Gordon Sectional Overlap Lazyback Seat Cover** makes a good fit under all conditions. The section to cover the back of the seat overlaps on each of the arm rest sections and is greater or less as the case may be. A misfit is impossible the makers claim, the lacing at the bottom preventing wrinkles, as should one appear the lacing is again adjusted to the proper tension. The overlap relieves all strain on fabric and fastening because of its flexibility permitting each section of the cover to conform to the movements of the upholstery without strain. All edges are bound with artificial leather and the arm rests covered with the same material.

Manufactured by the **J. P. Gordon Co.**, Columbus, O. Write for prices, samples and literature.



(When Writing to Advertisers, Please Mention The Automobile Journal.)

**Kennedy Auto Cover.**

The Kennedy Auto Covers are a live proposition for dealers. The season is almost at hand when car owners will store their automobiles and these cars should be protected. This company has designed covers for practically every purpose of storage. The cover protects the car from dust, dirt, cold and moisture. The makers claim that there is nothing better to put over a car for storage and the advantages of this cover are easily realized, for it also protects the tires by excluding the light and thereby preserving the rubber. The covers are made in different sizes for five and seven-passenger cars, also electrics. They are made of heavy, durable paper, that is securely reinforced to prevent tearing and which completely covers the car. There is also a cover of lighter weight paper and without the reinforcements, which gives good service when the cover is not to be used more than once. Five-passenger covers will cover the popular priced touring car and roadster with wheelbase up to 115 inches. For larger cars the seven-passenger size is preferable. Ford covers are for cars with short wheelbase. Shipped in lots of six or more.

Made by the Kennedy Car-Liner and Bag Co., Shelbyville, Ind. Write for prices and literature.

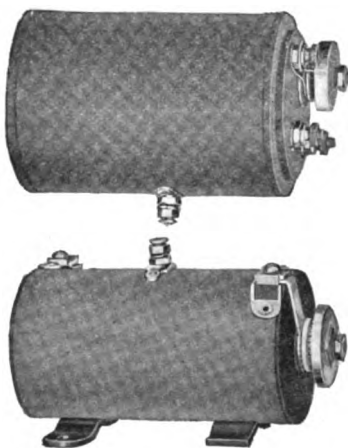
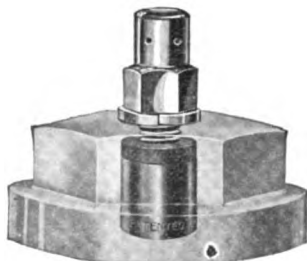
The Automobile Ignition Coil situation has in the past been a serious problem for jobbers, dealers and service stations, owing to the multiplicity of types on the market. Many jobbers and dealers have had to pass up the coil field almost entirely because of the large and varied stock of coils that would be necessary to take care of all requirements.

The Jefferson Electric Manufacturing Co. of Chicago have recently placed on the market a line of battery replacement coils and fittings which are sufficiently flexible to displace any type of coil on battery equipped cars. The extreme flexibility of Jefferson coils is obtained from several features, which include the fittings, adjustable caps, terminals and mounting arrangements.

With a small stock of Jefferson coils any service station, garage or repair shop will be prepared for any emergency. Heretofore it has been necessary to lay up a car for perhaps several days while a new coil was being obtained. Now, however, any car can be placed in service within a few moments. It is only necessary to remove the old coil and connect the Jefferson.

Starting conditions require a coil that will produce a hot, intense spark when the battery is at the lowest ebb. Jefferson coils are guaranteed to take care of this extreme condition.

To aid jobbers, dealers, service stations and garage men the Jefferson Electric Manufacturing Co. have compiled a folder containing complete and authentic data covering all standard battery ignition systems. This folder lists all makes of cars from 1912 to the present date and gives the year, model, type of ignition and style of Jefferson coil to be used for replacement. This folder will be sent free of charge to any dealer, garage, service station or jobber. Request should be addressed to the Jefferson Electric Manufacturing Co., 429 South Green St., Chicago.

**Mossberg No. 14 Socket Set.****Mossberg No. 4 Garage Set.****Carborundum Grinding Compound.****Jefferson Coils.****Imperial Gas Tank Seal.****Aloxite Cloth.**

The Imperial Gas Tank Seal meets the call of the times for gasoline economy. Perhaps the greatest waste of gasoline has been the one least thought of—that which evaporates or is jolted through the vent hole of the gasoline tank. Tests at the Armour Institute of Technology and the Associated Engineering Laboratories have proved that this waste of gasoline can be stopped by the Imperial Gas Tank Seal. It works equally well with gravity or vacuum systems and is so simple it cannot get out of order. The valve admits air automatically to replace the gasoline that is drawn out. It is easily installed in a few minutes time, fitting in a hole in the filler cap three-eighths of an inch in diameter.

Manufactured by the Imperial Brass Manufacturing Co., 517 S. Racine Ave., Chicago, Ill. Price, \$3.

Carborundum Valve Grinding Compound is one of the standard products proved by time. This product is made to be safely used in any gasoline engine and the choice of three grades is given, coarse, medium or fine. It is put up in from one to five-pound cans and is growing more popular with discriminating manufacturers, engineers, garage dealers and repair men.

Manufactured by the Carborundum Co., Niagara Falls, N. Y. One pound can, \$1.25. Five-pound can, \$5.

Aloxite Cloth, which is rapidly succeeding the old time emery cloth for general machine shop work, is put up in economy rolls as well as in reams, sheets and rolls. The cloth is cut in 1/2, 3/4, 1, 1 1/2, 2 and 2 1/2 inch widths, snugly wound upon spools. The operator simply cuts off a piece in any length or width he desires. The rolls are 50 yards long and are made with any degree of grit. Aloxite Cloth is also furnished in 9x11 inch sheets.

Manufactured by the Carborundum Co., Niagara Falls, N. Y.

Mossberg Wrenches, in accordance with a constant desire on the part of the makers to manufacture the most adaptable line of all steel wrenches, are arranged in sets, and tools designed to meet the exact needs of the different lines of assembly and repair work are put out in a convenient form.

The assembling of sets to meet the various needs has required years of intensive study of assembly and repair work to insure a particular adaptability for each and every set. Mossberg designers have undertaken this and the enthusiasm shown for the various Mossberg sets acclaims the success of their work.

Such sets as the various small socket sets, Set No. 4 of open-end wrenches, the double-end sets have proven very popular sellers and are found to exactly meet the many needs of automobile and general repair work. The No. 4 set shown is particularly popular in the trade because of its wide range of sizes. The nine wrenches with their 18 openings fit all U. S. and S. A. E. sizes from 1/4 inch to 3/4 inch bolt or screw diameters.

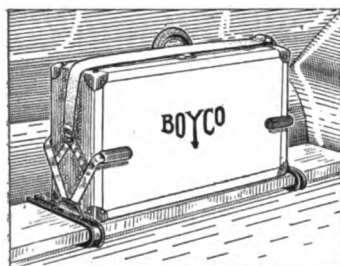
General service set No. 1, set No. 3 for automobilists, and agricultural set No. 2 of open-end wrenches, all contain a range of sizes to fit the particular needs for which the set is arranged, and like Set No. 4 provides the most economical way of securing needed tools.

Mossberg Socket Sets, too, have been arranged in various sizes so that economical sets may be had that are particularly adapted to assembly needs.

Set No. 14 shown is the most complete set of sockets and tools for all repair needs.

Manufactured by the Frank Mossberg Co., Attleboro, Mass.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

**Boyco Sure-Grip Luggage Carrier.**

Raydex is an all-metal, cellular device, which is placed in the upper half of the headlight behind the regular glass door. It contains more than 9000 metal reflectors, approximating nine square feet of polished reflecting surface. By means of this device all the rays which normally rise above the 42 inch level and cause glare are deflected and projected upon the road so that an even, clean cut illumination is obtained from the very front of the car to a distance of 500 feet or more. Raydex being composed entirely of metallic reflecting surfaces greatly increases the illumination on the road without requiring increased candle power in the lamp, because it saves light which is usually diffused and projects it upon the road where illumination is required.

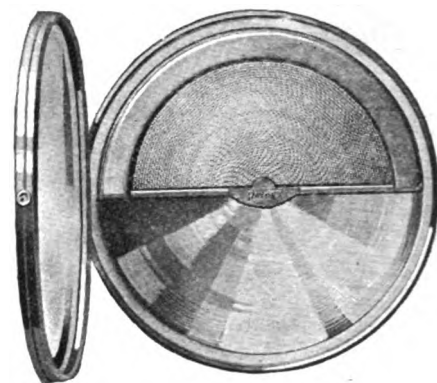
Manufactured by the Omolite Co., Inc., Jamestown, N. Y. \$6 per pair for all standard cars. Ford sizes, \$5.50.

The Allen Tire Case has a patented water shed feature which the manufacturers claim make it absolutely water proof. The highest quality enamel duck is used. Its strong canvas backing and non-peeling coating make it the best possible material for the purpose. Style "1" is a regular stock cover in plain black enameled duck which harmonizes with any car. This style is also furnished in any solid color at \$1.50 additional. Style "2" is made of enameled duck or fabric leather with the body of the case to match the color of the car and the tread strips matching the trimming or running gear—or vice versa to order only. Style "3" is the latest in case styles, made in fabric leather or enameled duck to match colors of car with beading to match the trimming.

Manufactured by the Allen Auto Specialty Co., 16-24 West Sixty-First St., New York City, N. Y.

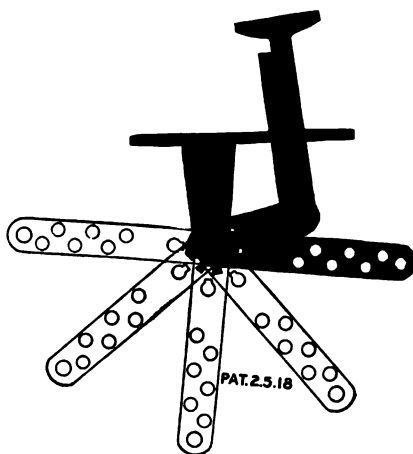
The Boyco Sure-Grip Luggage Carrier gives positive assurance of safety to articles carried by it. The construction is such that a perfect fulcrum is formed, securely gripping a suit case, canteen, camping equipment or any luggage such as might be carried upon the running board. Two adjustable clamps fasten it to the running board and it is easily removed without injury to the car. Its contents are protected from mars or scratches by a rubber covering over the carrier arms, which enables the luggage to reach the end of its journey in perfect condition. This device is, the makers claim, the only self-adjusting fulcrum constructed carrier on the market, and is one of the most necessary and convenient attachments the motorist could have on his machine. It is made in two sizes. No. 1 has a capacity for one large suit case, while No. 2 is intended for larger and more bulky packages. The strap which holds the luggage in place is made of heavy dark blue stay webbing and harmonizes with the holder, which is finished in black enamel.

Manufactured by the Boyle Manufacturing Co., Los Angeles, Cal. Write for prices and literature.

**The Amazon Supertires.****Raydex.**

The Amazon Supertires have as outstanding features reinforcements for protection against blowouts. This is an extra fabric breaker strip built into the side walls of the tire at the place where the "traction wave" is generated and where the tire is continually flexing. The breaker strip binds the tire together, preventing the side walls from overstretching under excessive load or strain. The tread is of live, velvety rubber and has no gritty compound, this, the makers claim, is the secret of its amazing mileage—to give to stones and road obstructions, not to resist them and consequently chip, cut and crack. The tire is guaranteed for 5000 miles.

Manufactured by the Amazon Rubber Co., Akron, O. Write for prices and literature.

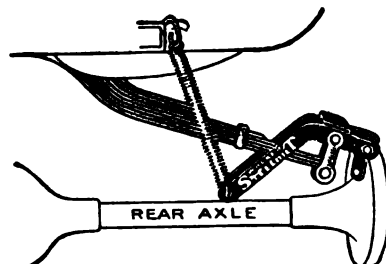
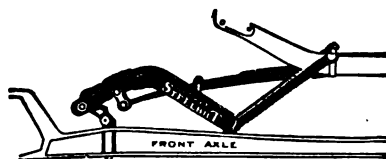
**The Moto-Meter.****The Petry Universal Pedal.**

The Moto-Meter is the danger signal of motor trouble. Every defect in a motor, such as a leaky piston ring, warped valves or empty oil reservoir, is instantly reflected in the temperature of the water and the Moto-Meter immediately registers "danger." The car operator cannot fail to see the signal, as it is directly in his line of vision and no one will intentionally disregard signs of a defective engine. The new model is designed especially for Ford cars.

Manufactured by the Moto-Meter Co., Long Island, N. Y. Standard size, \$10; the Overland, \$10; the Junior, \$5, and the Midget, \$2.50; Ford size, \$2.50.

The Petry Universal Pedal is a pedal designed for muffler cut outs, accelerators, exhaust whistles, heater valves, etc. This device can be used either to pull or push and is made of high grade steel, gun barrel finish.

Manufactured by N. A. Petry Co., Inc., 1307 Race St., Philadelphia, Pa. Price, 75 cents.

**Walker Steelbilt Shock Absorbers.**

The Walker Steelbilt Shock Absorbers for Fords smooth out rough going—soak up the shocks and cradle the Ford in a big easy car sway, the makers claim. They are built entirely of steel with the springs extra long, oil tempered and of the utmost durability. The spring bolts are turned from cold rolled steel and hardened—equipped with oilers. The free unhampered action given to both the coils and springs require no sliding parts and they are thoroughly safe and as strong as steel can be in every section.

Manufactured by the Walker Manufacturing Co., 31 Hamilton St., Racine, Wis. Price, \$7.50 per pair.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Bay State Autokit Wrenches will remove any nut, bolt or cap screw, reaching it wherever it is located, at any angle. The outfit includes an adjustable ratchet handle and shank with a series of sockets, constituting a complete combination with which every kind of work on a car can be accomplished. These tools are of proven design and made of the highest quality material, being guaranteed 100 per cent. efficient, and as the makers claim will give extreme satisfaction in the hardest service.

Manufactured by Bay State Pump Co., Boston, Mass. Write for prices and literature.

The **Dyer Welding and Carbon Removing Outfit** has two utilities included, that of welding and cutting by the oxy-acetylene process and of removing carbon from the combustion chambers and cylinders of engines. With this apparatus the garage man and repair man can quickly and satisfactorily do all kinds of brazing, welding of broken parts, frame straightening and many other things requiring the use of a welding outfit. The material used in this outfit is of the highest grade. The regulators are strongly built and accurate. The Dyer Co. uses the United States Gauge Co.'s gauges, and the hose used is of extra heavy five-ply fabric. The outfit includes a truck made of the best grade of boiler plate strongly welded. The torches are simple in construction and easily handled, being of light design and highly efficient. The welding torches cannot back-fire under any circumstances and can be operated to a low enough acetylene pressure to practically empty the gas cylinders.

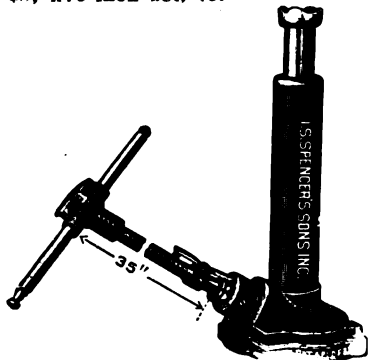
Manufactured by the G. H. Dyer Co., Cambridge, Mass.

The **Fawcoco Combination Wrench** is a combination gasoline gauge, oil cock wrench and cleaner, and the claim is made that it will not only measure the gasoline in the tank, but provide the only sure means of learning whether there is oil in the crank case, as the pin will prove if the oil cock is stopped up or the oil exhausted. It is made of nickel plated, coppered, Bessemer steel rod, with a very high class finish. They are put up in complete packages for the convenience of the trade and dealers are furnished with a very handsome counter display card, upon which is mounted one of the tools, which helps considerably in their sale.

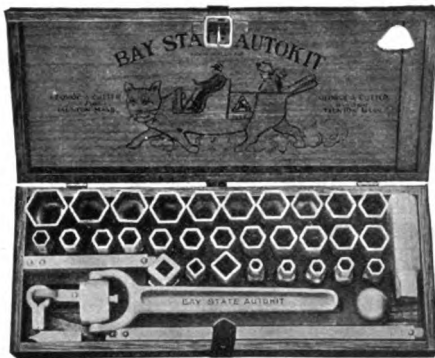
Manufactured by J. H. Faw, Inc., 37 Warren St., New York City. Retail price, 45 cents.

The **Universal Vise Attachment** is based upon an entirely new mechanical principle. It instantly converts an ordinary square-jawed vise into a tool of a thousand purposes, through the independent action of each "tooth" or "gripper" of its jaw in clamping the form or shape upon which work is to be done. This vise is very efficient for holding irregular shapes. It is made of cold rolled steel, tempered and electrically welded and will reduce the working time by half where irregular shapes are involved.

Manufactured by the Universal Equalizer Co., Cincinnati, O. Price four-inch set, \$8; five-inch set, \$9.



Acme Automobile Jack.



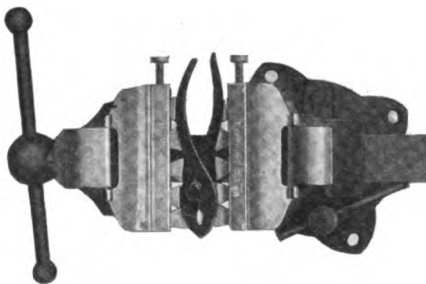
Bay State Autokit Wrenches.



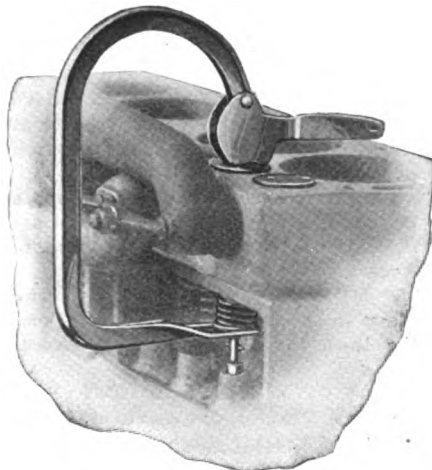
Dyer Welding and Carbon Outfit.



Fawcoco Combination Cleaner.



The Universal Vise Attachment.



Beardley Double Acting Valve Lifter.

Eagleline Motor Oils and Gear Oil. Lubricating oil for internal combustion engines must be of the proper consistency, so that it flows freely and holds its viscosity, with a certain percentage of the resistance particles of the natural oil extracted and yet not too great a percentage of the lubricating base of the natural mineral oil removed, which gives it its quality for efficient lubrication. To ascertain the proper proportions in the refining of as near perfect a lubricant for gasoline engines as possible requires long years of experience. Eagleline motor oils were put through the most exhaustive tests for a period of 20 years and now have reached the zenith of perfection. They are refined from the natural mineral oil and contain no animal or vegetable fats that tend to decompose into glycerol and acids, which lower the lubricating efficiency. Eagleline gear oil is especially compounded to the exact consistency for efficient lubrication of transmission and differential gears and its use has shown that there is less wear on the gears and thereby upkeep expense is reduced to the minimum.

Eagleline motor oils and gear oil are put up in the company's trade marked containers that serve the purpose of cleanliness and convenience in use, as well as assuring the customers no spurious substitutes.

Eagleline motor oils and gear oil are prepared and marketed by Eagle Oil and Supply Co., 44-5-6 India St., Boston, Mass.

The **Beardsley Double Acting Valve Lifter** is a time saver, for it removes and replaces Ford valves in less than a minute and in other cars in half the time of other valve lifters. The foot of the device is simply shoved under the spring washer and the cam lever pushed down, which action holds the valve down and lifts the spring up, giving more room to remove and replace quicker than any other valve lifter.

Manufactured by the Loomis-Beardsley Co., 71 East State St., Columbus, O. Write for prices and literature.

The **Peteler Jack** when placed in position beneath the car by a long telescoping handle having a short stroke, raises the car three-eighths of an inch on each stroke. When lowering the car the handle is turned, operating a small lever, which reverses the action and the load comes down easily and smoothly. The jack is then withdrawn by the handle and the parts stowed away in the tool box. It has a capacity of 3000 pounds.

Manufactured by the Coe-Stapley Manufacturing Corporation, 115 Broadway, New York, N. Y. Price, \$6.

The **Acme Automobile Jack** may be operated from the end of the longest car without soiling the clothes, the outstanding features being ball thrust bearings and a large base area. All working parts are enclosed in a dirt and grit proof case and they run in heavy grease. The lift screw is $\frac{1}{4}$ of an inch in diameter.

Manufactured by I. S. Spencer's Sons, Inc., Guilford, Conn. Price \$6.50.



Peteler Jack.

Ralph De Palma Wins Sweepstakes

Takes Three Out of Four Events at Chicago
And Establishes Two New World's Records

Ralph De Palma, driving a racing Packard, won the international sweepstakes at the Chicago Speedway on July 28 and incidentally established two new world's records for track performance, covering the 10-mile event in 5:24.80, or

at the rate of 110.8 miles per hour, and the 20-mile event in 10:50.2, or at the rate of 110.7 miles per hour.

There were four events, two-mile, 10-mile, 20-mile and 30-mile, and De Palma won the last three and came in a close second behind Dario Resta in the first race. The results were decided on the point system, De Palma receiving 22, Chevrolet 18, Resta 15, Mulford 10 and Vail 2. De Palma won \$17,000; Chevrolet, \$5000; Resta, \$3000; Mulford, \$1500, and Vail, \$500.

The results of the races were as follows:

TWO-MILE EVENT.		
Driver	Time	M. P. H.
Resta	1:18.0	92.2
Chevrolet	1:18.4	91.7
De Palma	1:19.0	91.1
Mulford	1:20.7	90.0
Vail	1:37.0	74.2

TEN-MILE EVENT.		
Driver	Time	M. P. H.
De Palma	5:24.8	110.8
Chevrolet	5:25.0	110.7
Resta	5:26.0	110.4
Mulford	5:26.2	110.3

TWENTY-MILE EVENT.		
Driver	Time	M. P. H.
De Palma	10:50.2	110.7
Resta	10:51.6	110.4
Mulford	10:52.0	110.04
Chevrolet	10:52.2	110.03

THIRTY-MILE EVENT.		
Driver	Time	M. P. H.
De Palma	16:54.8	106.42
Chevrolet	16:55.8	106.30



Ralph De Palma, Who Covered 20 Miles
at the Rate of 110.7 Miles Per Hour.

CALENDAR OF SHOWS AND RACES

SALINA, KAN., JULY 29-AUG. 4—National Tractor Demonstration, under the auspices of the National Implement and Vehicle Association.

UNIONTOWN, PA., AUG. 3—Race, auspices Uniontown Speedway Association.

FULTON, N. Y., AUG. 6—Tractor Demonstration, auspices State Food Commission, near Fair Grounds; E. W. Underwood, Manager.

PROVIDENCE, R. I., AUG. 10—Racing meet.

SHREVEPORT, LA., AUG. 14—Fifth Annual Convention, Dixie Overland Highway Association.

NEW YORK, N. Y., AUG. 17—Racing Meet, Sheepshead Bay, auspices Sheepshead Speedway Motor Club, Inc. (Sanction pending.)

UNIONTOWN, PA., SEPT. 2—Race, auspices Uniontown Speedway Association.

INDIANAPOLIS, IND., SEPT. 2-7—Automotive Show in conjunction with Indiana State Fair; auspices Indianapolis Automobile Trade Association; John Orman, Manager.

CHICAGO, ILL., SEPT. 7—Racing meet, Chicago Speedway.

OAKLAND, CAL., SEPT. 9-OCT. 6—Pacific Coast Land and Industrial Exposition, Civic Auditorium.

CHICAGO, ILL., SEPT. 14-21—National Truck, Tractor and Accessory Show

under the auspices of the Automotive and Accessories Exposition, Inc., Municipal Pier. H. V. Buelow, manager.

MONTREAL, CAN., SEPT. 17-19—Farm Tractor Demonstration for Eastern Canada.

NEW YORK, N. Y., SEPT. 21—Racing Meet, Sheepshead Bay, auspices Sheepshead Speedway Motor Club, Inc. (Sanction pending.)

DETROIT, MICH., SEPT. 23-4-5—Convention, National Association of Purchasing Agents; Hotel Pontchartrain.

CINCINNATI, O., OCT. 6—Racing Meet.

DALLAS, TEX., OCT. 14-27—Seventh Annual Automobile Show; Texas State Fair.

OTTOWA, ONT., OCT. 16-18—International Plowing Match and Tractor and Farm Machinery Demonstration. Experimental Farm.

CHICAGO, ILL., Oct. 28-Nov. 2—Convention and Automotive Equipment Exhibit, National Association of Automobile Accessory Jobbers.

DES MOINES, IA., Dec. 2-5—Tractor Show in connection with Convention of the Iowa Implement Dealers' Association.

KANSAS CITY, MO., FEB. 10-15, 1919—National Tractor Show, auspices Kansas City Tractor Club; Guy E. Hall, Secretary.

THIRTY-MILE TOUR IN CITY OF MADISON, WIS.

For the benefit of visiting tourists the Good Roads and Tourists' Bureau of the Madison (Wisconsin) Association of Commerce has mapped out an auto tour of the city, 30 miles in length. Guide signs like the above have been placed along the entire route, at the right hand side of the street, and enable the traveler to take up the tour at any point, go over the complete route and come back to his original starting point. Aside from their basic motive these signs have an aesthetic significance in that they bear the imprint of the beautiful new state house at the top, and remind the tourist that he is visiting Wisconsin's capital city.

A guide circular has also been prepared, containing a map of the up-town district of the city, on which the principal buildings and up-town points of in-



terest are marked by numbers. The key to the numbers, printed at the side of the map, makes these points easy to locate.

The city tour, which takes about two hours, gives the tourist an opportunity to visit the points of interest, view the important public buildings and traverse some of the drives about the lakes on either side of the city. Guide signs have been erected to mark the route to some of the more distant beauty spots on the lakes, which, if the tourist desires to follow them, lengthens the tour to 60 miles.

Because of the prominence of the capitol dome from a distance of several miles around Madison, tourists have found it very easy to get into the city, but the irregularity of the streets gives them some difficulty in finding their way out. To facilitate this the Good Roads Bureau has erected signs on the main streets, indicating the roads leading to the state trunk highways.

NELSON MFG. CO. MOVES INTO NEW AND MODERN PLANT.

The A. Nelson Manufacturing Co., Chicago, makers of automobile parts and accessories, repair parts and specialties for Ford cars, brushes for starters and generators, ignition specialties, plain and castellated nuts, special screw machine products and sheet metal stampings, have moved into a new and modern plant at 2662-2722 Southport avenue.

With the additional manufacturing facilities now available the company will be in a position to meet the present demand promptly.

The Combination Lamp and Horn

Novel Signaling Device Taken Over by Wire Wheel Corporation of America.

Through the absorption of the basic patent rights to a combination lamp and horn, the Wire Wheel Corporation of America, the dominant company in the country in the wire wheel business, has departed from its standard line of production.

The combination lamp and horn is very ingenious and its salient features stamp it as being a radical refinement over present day practise in signaling. It is the joint invention of George Stowe and George E. Molyneux.

The combination of the lamp and horn brings about a great saving of parts and material. The horn casing, bracket, trumpet and screws and clamps innumerable, become unnecessary and the combination of lamp and horn with its fewer parts, far from detracting from the efficiency of either, accentuates the horn, and locates it in the position where it logically belongs—right in front of the car.

The inventors, in their patent application claimed "to provide a compact structure by which an electric horn and electric light may be intimately associated, and the one disguised by the other without destroying the utility and operation of either device," and this they have ef-

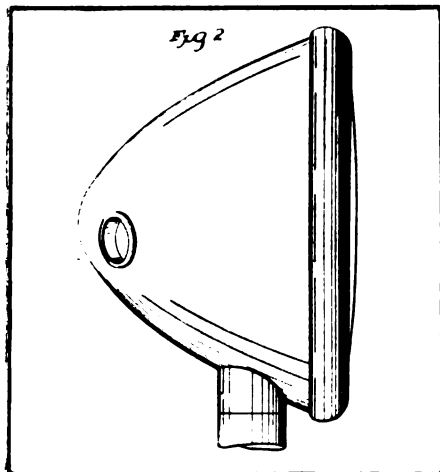
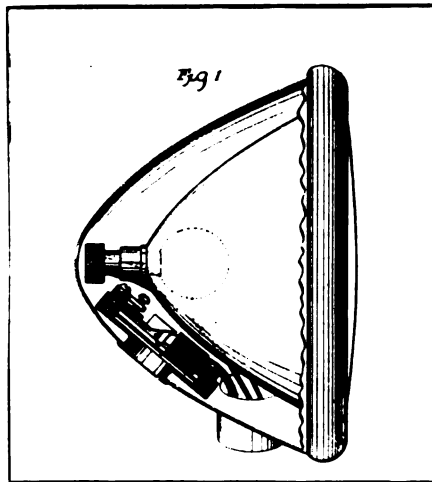


Figure 2 Shows the Only Change Necessary to Be Made in a Standard Type of Lamp for the Installation of a Vibratory Type of Horn. The Ferruled Hole, Towards the Back of the Lamp, Becomes at Once the Supporting Member of the Signaling Device and the Mouth of the Horn.

fectually accomplished. This applies to both vibratory and rotary horns, but while the former is simply applied to practically standard makes of lamps, the rotary or motor driven horn is housed in a lamp especially designed and made for its proper application.

This application and, in fact, the whole device for bringing the combination into

being is simplicity itself. Near the rear of a standard lamp of the familiar bullet type and below the horizontal diameter of the lamp, a hole is made and the metal edges turned up and ferruled. This aperture is preferably slanted both downwardly and rearwardly, to prevent rain beating in, or the careless flooding of the lamp by the car washer. This ferrule becomes the supporting member



Combination Lamp and Horn, Showing Special Lamp Body and Location of Rotary or Engine Driven Type of Horn Back of the Reflector. Compactness is Apparent with All Wire Leads Threaded Through the Tubular Member of the Lamp and Its Regular Supporting Post.

of the signaling device, as well as the trumpet or mouth of the horn, as this is the aperture through which the signaling sound is emitted.

The combination horns and lamps are operated in the conventional push button method, and the disposition of the horn to the front of the car is the important departure from the side of the car, and the more general location under the hood.

One interesting feature about the new device is the possibility of intensifying the volume of sound for signaling purposes. The "toot" of the small horns becomes a deep and commanding "boom" with the slight adjustment of the vibrator and the inventors explain this by the peculiar acoustic properties in the back of the bullet shaped lamp—the concentration of sound and its omission under impulse from the mouth located directly at the front of the car, where it can be heard with proper intent.

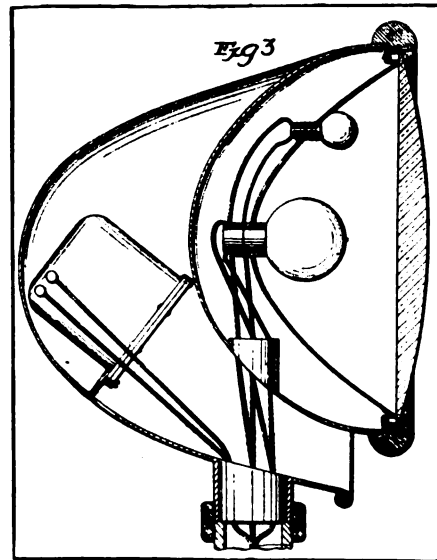
What the activities of the Wire Wheel Corporation of America in its departure from standard line of production may portend for the future is not definitely known. A large modern plant located at Springfield, Mass., and taken out of wire wheel production at the opening of war activities, and now devoted to government work, would be available to the corporation should it decide to go into manufacture of the combination horn and lighting device. In that case wire wheel production might be confined to greatly enlarged quarters at the home plant at Buffalo, N. Y.

OVERALLS FOR PROTECTING AUTOMOBILES IN DRIVEWAYS.

Before war conditions forced a change, automobiles were shipped from the factory in tightly roofed box cars of extra dimensions, blocked in carefully and allowed plenty of room to prevent contact with the car walls and other machines. As a consequence machines were generally unloaded at destination in as perfect condition as they left the factory.

Now the shortage of box cars has made any kind of a car welcome at the factory. Machines are shipped on flat cars and in gondola coal hoppers. Many thousands of automobiles have had to be delivered overland under their own power. In all of these cases exposure to dust, hail, wind, rain and snow mars and scratches the car bodies, often making refinishing necessary. This extra expense, especially in overland shipment, which is already three times as expensive as rail shipment, is serious.

To prevent such injuries in transit, a Baltimore dealer has invented "car



The Illustration Shows the Vibratory Type of Horn Set in Back of the Reflector of the Standard Type of Lamp and Wires Leading Into Regular Supporting Post.

overalls." The contrivance consists of a padded stick fastened across the front of the radiator, to which strips of webbing are fastened and stretched tight on both sides of the car. To these strips the overalls made of either fabrikoid or a rubberized fabric are buttoned. Strips of wood along each running board and straps attached to the top hold the overalls out from the car body, which is completely enclosed and perfectly protected from dirt and the weather. A separate covering is used for the front springs and the radiator. Each pair of overalls weighs about 40 pounds. They can be folded up compactly and carried in an ordinary suit case. The great durability of the material permits the use of the overalls indefinitely, while its small cost is saved over and over again from its prevention of renovating expense.



FAN ATTACHED TO SHAFTING. (Figure 503.)

Now that summer is well under way and the dog days nearing, the constant moving of air in the garage will do much to raise the productiveness of the employees. A fan made of sheet tin stiffened with a cast iron rod throughout its length that is riveted to it and attached to the shafting with "U" irons and bolted fast. It must be placed somewhere on the shafting where it will swing clear of the workmen and be fastened securely so that it cannot fly off.

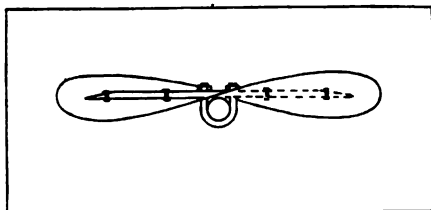


Figure 503.

CLAMPING POLISHED PARTS.

It is often necessary to clamp the polished nickel or brass parts of an automobile in a vise to be drilled, threaded, etc., for the attachment of accessories, and is very often a difficult matter, as cloth or felt wrapped about them does not prevent them from slipping nor hold them firm, and thus they are liable to be scratched in spite of the precautions taken.

Sprinkle some dry plaster of Paris on a heavy paper and wrap in this paper the article to be held. Be sure that there is plenty of plaster between the paper and the polished surface. In the case of polished pipes, wooden blocks having hollow faces should be used. If these are not obtainable the ordinary lead faces of the vise sprinkled with the plaster may be inserted. Felt covered with the plaster will obtain the desired result. The plaster is used in each instance to increase the friction and so enable the part to be held more firmly.

SPOKE CLEANING BRUSH. (Figure 504.)

The purchase of two bottle cleaning brushes, the removal of the brushes from their handles and uniting them, fitting them back into one handle, shaped in

the manner shown in the accompanying cut, affords a quick and easy manner in which to clean the spokes of an automobile wheel.

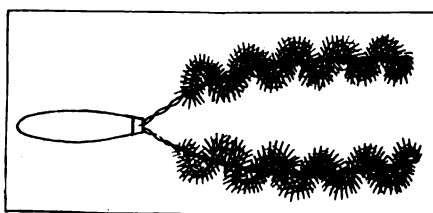


Figure 504.

PREVENTING TIRE VALVE LEAKS. (Figure 505.)

Not many motorists when changing a tube examine the nut at the bottom of the valve stem. This nut is provided to prevent leakage and does so by clamping the tubing surrounding the valve head under the seating plate.

This joint is more or less strained upon removal and will usually be found loosened to the extent of a quarter or half turn. If this is not tightened it will result in a small leak, probably the pressure in the tire falling 15 to 20 pounds in a week, the leakage being so small each day as to fail to draw the attention of the driver responsible for the care of the car, and if not attended to will later develop into more serious tire trouble.

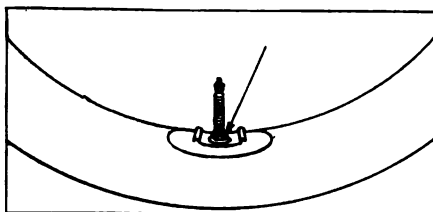


Figure 505.

GOOD REPAIR FOR CRACKED SPOKE. (Figure 506.)

Very often on a slippery street the car skids and is thrown against the curbing, the result being a cracked spoke. This

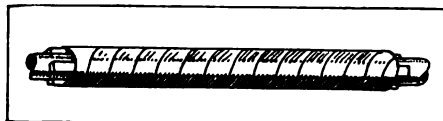


Figure 507.

should be immediately fixed as neglect will probably result in the spoke breaking off. Drive to a machine shop and have a hole drilled through the split spoke, a rivet inserted and hammered together tightly. The rivet head will prevent side play in one direction, while the shank of the rivet will prevent motion at right angles. The rivet can be painted the color of the wheel and will not be noticed except upon close inspection.

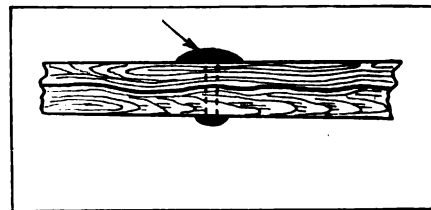


Figure 506.

ABOUT BATTERY CONNECTIONS.

One of the most common and yet amazing things which happen to battery connections can be prevented in a very simple way. It will be found that inside the copper wire corrodes to such an extent that it severs itself completely and, of course, breaks the circuit. This corrosion is caused by the gas of the sulphuric acid in the cells, helped by the damp atmosphere attacking the copper and converting it into a powdery copper sulphate. This defect can be overcome by coating the wires at and around the terminals with cup greases or some non-fluid oil.

REPAIRING GASOLINE LINE. (Figure 507.)

When the gasoline pipe breaks somewhere in its length, the usual method of repair is to slip a piece of rubber tubing over the broken portions. This method is not likely to be a success because the vibration of the pipe will, in a short time, break through the rubber tubing. If the rubber tubing is not at hand, however, a temporary repair may be made by winding a short piece of tape about the broken ends of the pipe and then strengthening it with thin wooden splints, winding tape about the whole to fasten it securely.

AN EFFICIENT GUM AND FABRIC RACK.

(Figure 508.)

Here is a gum and fabric rack which vulcanizers are finding convenient and practicable. It keeps the repair stock clean and permits several men to work at the same table without interfering with each other. It is a wooden frame, made to hold several rolls of gum and fabric, revolving on a stand fastened to the table. It can be turned in any direction to accommodate workmen at the opposite ends of the table.

The frame is of two by four lumber, with holes bored through the sides to hold the rolls. The rack revolves on a piece of half inch pipe, threaded on one end to fit a wide collar, which is screwed to the center of the table. On the bottom of the rack is screwed a piece of two inch flat iron, into which a hole a trifle larger than the pipe support is bored. This hole extends into the wood an inch to act as a recess for the pipe support, and increases its rigidity. Then another collar is screwed to the iron to hold the pipe in place.

On the end uprights of the rack may be hung knives, rollers, stitchers, scissors, etc., thus keeping the table clear of working tools and allowing more table space for the repair. The entire contrivance is so simple that any vulcanizer can construct one very easily. This type of rack is used in the Goodyear School of Tire Repairing, Akron, O.

GENERATOR TESTING.

(Figure 509.)

If there is an engine lathe at hand when testing electrical equipment, there is no need of specially designed machinery. The motor to be tested can be clamped in the lathe bed and driven from the spindle through a flexible shafting. The shaft is made of a piece of hose containing a coiled steel spring. One end of this hose is clamped in the lathe chuck and the other end fitted with an attachment for coupling to the armature shaft of the motor. This arrangement will permit the same work as the expensive apparatus designed to accomplish the same end.

TO SEAL GASOLINE JOINTS.

A very small number of automobile owners and operators know the value of soap as a positive seal for leaking gasoline joints. There is one place in particular where the gasoline oozes out and that is the filler tank when the tank is full or nearly so. If the tank is hung at the rear of the car the gasoline spreads over the outside of the tank, collecting dust and taking the gloss from it. A coating of ordinary soap on the gasket and threads will prevent this defect even though the tank is full and in this way one can keep the tank as clean and shiny as the rest of the car. This method will also prevent leakage around the carburetor joints.

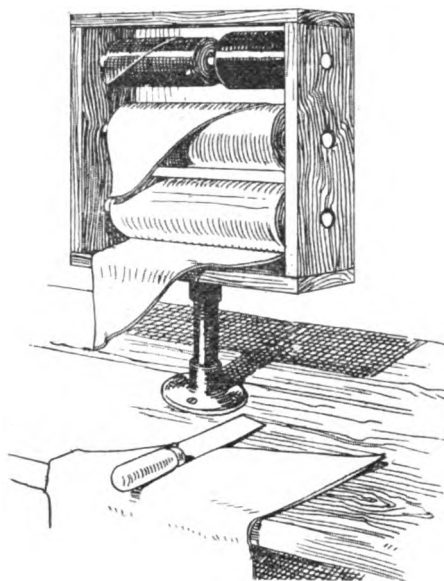


Figure 508.

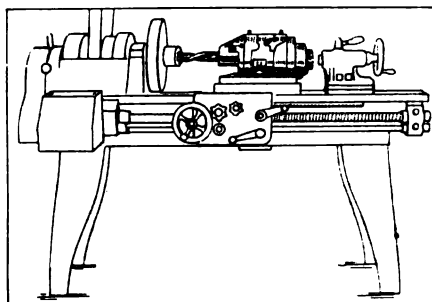


Figure 509.

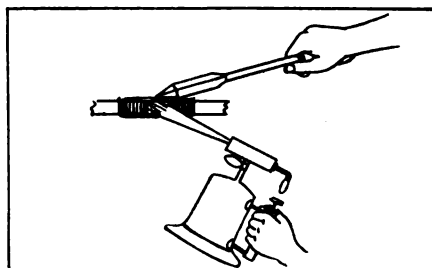


Figure 510.

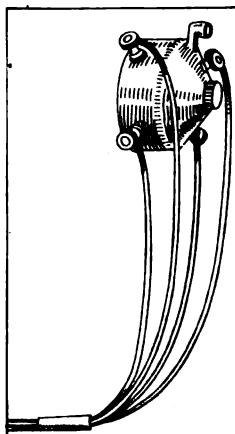


Figure 511.

PROTECTING FORD TIMER WIRES.

(Figure 511.)

The wiring on Ford cars near the commutator is so placed that it soon becomes soaked with oil and covered with dirt. The wires, which are painted various colors for identification, quickly become coated, so that all semblance of color is lost. It is therefore impossible to make use of colors as a guide in replacing them on the timer should they be removed. A piece of rubber tubing, fiber will do as well, about $2\frac{1}{4}$ inches long by $\frac{3}{8}$ of an inch wide, is placed over the assembly of wires and pulled up close to the timer. The wiring inside of this tubing is, of course, kept clean from oil and dirt, and when the occasion arises to remove the wires, the tubing is easily slipped back.

CARE OF THE TOP.

If a top is folded when it is wet it will sooner or later be ruined. Grease or dirt should not be removed with gasoline. This method tends to dissolve the rubber composition in the fabric and will make it blister. The leather top should be washed with soap and water, the water preferably warm. A top dressing should then be applied. The top will hold its shape better if continually left up. When it is lowered care should be taken to push the folds of the fabric well in from the bows, as this will prevent creasing. A brushing inside will do much to lengthen its life. The top curtains and celluloid windows that have been scratched or blurred can be renewed by an application of acetone varnish.

The result of the directions above being carried out will enable the owner to take pride in the appearance of his car and also add an appreciable amount upon the car should he wish to sell.

FIXING LEAKS IN GASOLINE LINE.

(Figure 510.)

Very often the gasoline line starts to leak as a result from chafing at some particular point. An easy way to remedy this is to obtain some soft wire, wrapping it tightly about the tubing, running a little way each side of the leak and then going over the wire with solder. This will make an efficient and permanent repair. The wire also preventing chafing again at that point.

GASOLINE FIRES.

If you are so unfortunate as to be the victim of a gasoline fire in your garage, or anywhere else for that matter, remember that gasoline does not mix with water, and consequently water should never be used to extinguish such a fire. If a patent fire extinguisher is not at hand throw sand on the blaze, or use sawdust. The latter is not easily ignited and when it does burn there is no blaze of any consequence.

PLATE XXIV.

A TWO-CAR CONCRETE GARAGE

Permanent Type of Structure with Moderate
Ornamentation and a Plain Wall Finish

Designed by the Architectural Department of The Automobile Journal.

ALL things considered, probably the most appropriate garage structure is the solid concrete type, as not only is the first cost the last if properly built, but under present material and labor market conditions it is the cheapest.

The building shown in the accompanying plate is ideal for the average city estate, either as a means of accommodating the owner's two cars or to provide an income which in a few years should defray the entire cost of its construction. Aside from the doors and window frames, which can be purchased cheaper than they can be built on the premises, the only woodwork is the roof and the moderate ornamentation shown.

Once erected the owner has a building which is not only a valuable addition to his property, but it is fireproof and requires practically no outlay for upkeep or repair. The materials used in a building of this kind are accessible most everywhere and its erection could be accomplished by a person familiar with cement work and handy with carpenter's tools. It is often more satisfactory in the end to have a number of contractors figure on a contract for the building, specifying material to be used, as in this way the owner knows exactly what he is to receive and avoids the worry of looking up labor, material, prices and other incidentals that are quite numerous.

With a foundation and walls that should really improve with age it is naturally the best policy to see that the wood, paint and hardware used in the structure is of the very best quality, as it insures the permanence of the investment.

Proper foundation work is essential in making for the permanence of the entire structure. The installation of the foundation walls would be governed of course by local conditions, but under average conditions the foundation need not be over 10 inches wide and 42 inches deep. The walls should be carried at least five inches above grade to provide for a concrete floor of this thickness. The foundation mixture should be made in the proportion of one part cement, two and a half parts sand and five parts screened gravel or crushed rock.

The ground within the walls should be scraped and well rolled or tamped to secure a good foundation before the concrete floor is poured, and the floor drain, forms for the floor

pit, water pipes and pipes from the gasoline storage system should all be installed. The floor may be laid in one course, using a mixture similar to that in the foundation, but it is better to lay four inches of the floor of this mixture and coat it with a one-inch facing of one part cement and two parts sand.

In a two-car garage it is always advisable to have two doors opening directly on the position to be taken by the car when it is brought in, as this saves the trouble of manouvering the car about inside the building and the attendant danger thereto. The elevation shows two large doorways eight feet by nine feet, which are provided with swinging doors hung on Stanley wrought iron garage door hinges, consisting of sets No. 1459 and 1456 hinges and No. 1052 bolt. These hinges are specially designed for heavy garage doors and are exceptionally strong. They are equipped with ball bearings fitted between the hinge joints. The long leaf provides a rigid and permanent hanger and time and labor are saved in hanging the doors, as the jamb only is mortised, the door put in place and the surface leaf applied to the face of the door with either carriage bolts, lag or wood screws. The No. 1459 hinge is 36 inches long, having a $2\frac{1}{4}$ inch offset and $4\frac{1}{2}$ inch throw and the pad is four inches wide.

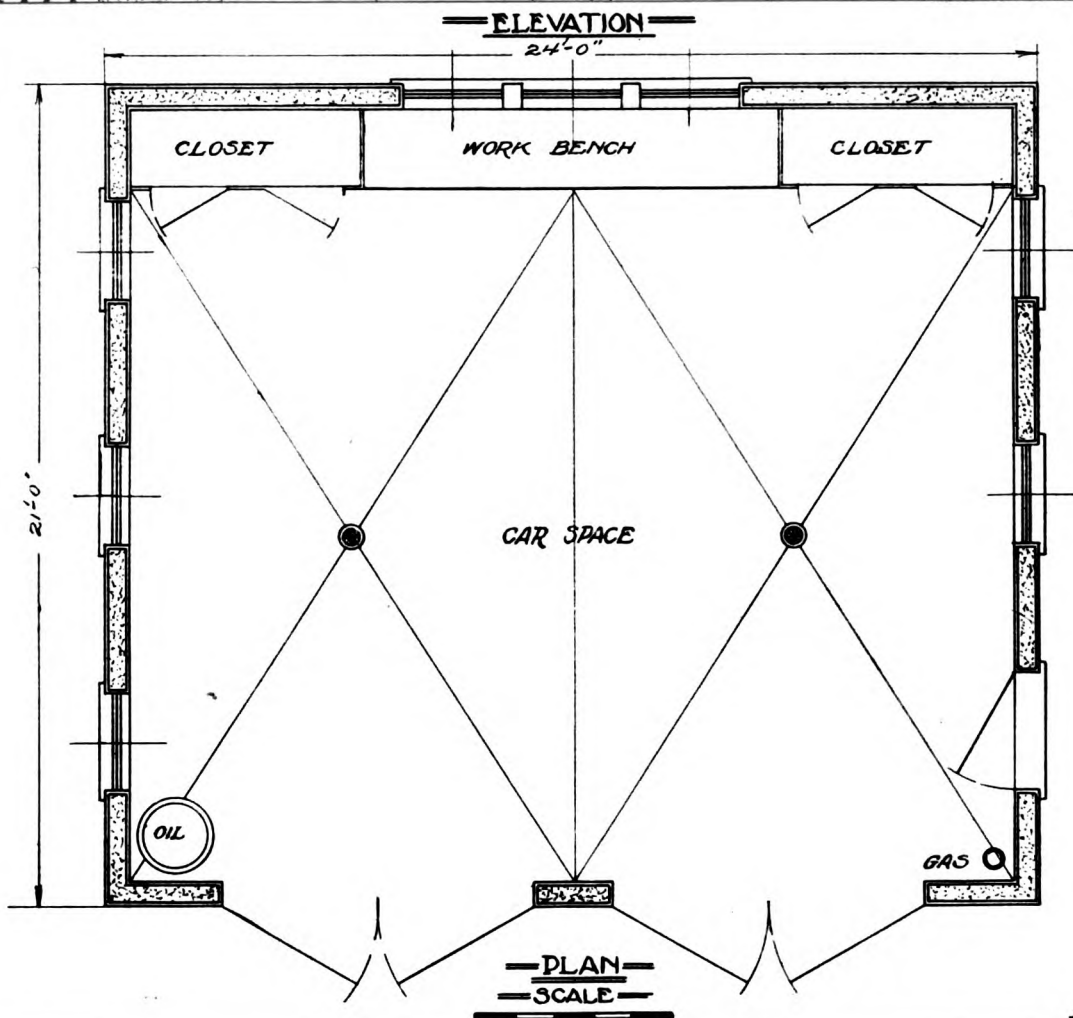
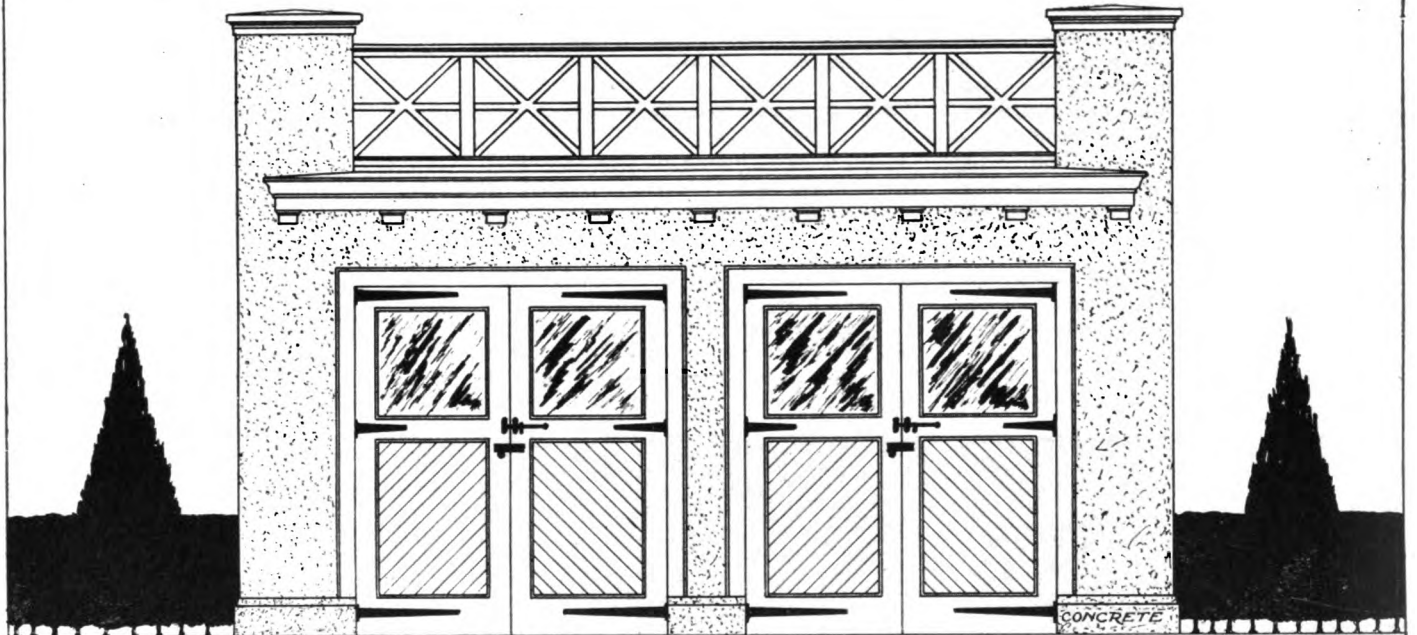
The exterior concrete walls are eight inches thick and when these are being erected it would be desirable to also erect the wall separating the two car spaces if such a division is desired, as is often the case owing to the preference shown by many people to have an individual compartment for their machine. If the owner, however, is to use both spaces a dividing wall would not be of any advantage.

The roof, of wood, is slightly pitched towards the rear, inclining an inch to the foot. The plates, 2x6 inches, are bolted to the concrete walls and the rafters, 2x8 inches, are laid 24 inches on centers. North Carolina pine boarding $\frac{7}{8}$ inches thick are nailed to the rafters and covered with a three-ply layer of roofing paper.

The balustrades and cornice should be of clear white pine stock and painted.

The cost of the building completed should not exceed \$1600.

PLATE XXIV



— OSCAR, NERVE DROUIN —

REAR SIGNALING DEVICE ESSENTIAL ON ENCLOSED BODIES.

Arm signaling in the present age is comparable to the signal fires in use by the Indians of old as compared to the telegraph of today, according to K. G. Barkoot, distributor of the Roedding signal tail light, who has taken issue with John N. Willys, an advocate of the old fashioned method of signaling. It is the contention of Mr. Barkoot that closed cars are coming more and more into favor and that in the closed cars arm signaling is impracticable and dangerous in the extreme. This is especially the case in winter weather according to the Detroit, who also points to the fact that 90 per cent. of the cars seen on the streets even in summer are either of the permanent roof top variety or have their tops up. Mr. Barkoot says that people have come to the opinion that there is about as much sense in chasing through the country in an automobile with the top down as there would be in traveling on an electric car without a top or a

drum on which there are large enough letters to be seen, the control being on the steering wheel. The one button blows the horn and signals also through the revolving cylinder the driver's attention. The device is operated electrically.

J. A. DRAKE OF CAMPBELL-EWALD CO. GOES TO CAMP CUSTER.

John A. Drake of the Campbell-Ewald Co., Detroit, and one of the most popular men in the Detroit automotive advertising circles, is now at Camp Custer. Before leaving for military duty he was given a rousing testimonial at a meeting of the employees of the Detroit office, when Henry T. Ewald presented him with a handsome wrist watch.

Mr. Drake held a position of responsibility with the Campbell-Ewald Co., which is the largest in Detroit and one of the largest in the United States. Among the firms whose advertising Mr. Drake helped direct were the Covert Gear Co., the Bearings Service Co., the United Motors Service, Inc., and the Har-

riers, lakes, camps and other points of interest to tourists. These sectional maps are the finest of the kind ever published and were compiled from United States government surveys, official state surveys and original sources.

In addition to a collection of important facts about the state the book also contains a summary of the fish and game laws with complete instructions to visitors who are on fishing or hunting trips.

The book is bound in gold finished cloth and sells for \$1.50 a copy. It is issued from the Maine Automobile Association Touring Bureau, 12 Monument square, Portland, Me.

MATHEY BROS. EXCLUSIVE SOLID TIRE DEALERS IN NEW ENGLAND.

The business of Mathey Bros., 76 Cummington street, Boston, is unique in that it is the only one in the New England states confined exclusively to shoes for power trucks, and that it specializes service not obtainable elsewhere. The company consists of F. A. and Edward Mathey, both of whom for more than 15 years have dealt in tires, being associated with some of the leading manufacturers of the country, such as the Firestone, Kelly-Springfield and Gibney companies. For more than five years F. A. Mathey was the largest tire dealer in New Hampshire. The brothers sold tires when they were used exclusively for horse vehicles, and they have kept pace with the industry in its development.

The concern engaged in business less than a year ago in a small store in Sudbury street, Boston. The policy was to deal only in solid truck tires, to sell tires of all makes and types (standard shoes only) of highest quality, at extremely advantageous prices, and besides handling pressed-on, demountable, side flange, cushion, block or smooth treads, to specialize odd sizes and types that would be difficult to obtain through regular channels. The increase of the business was rapid and a store in Portland street was added. From less than 100 tires the stock increased to more than 3000 tires. This impelled leasing a new building erected at 76 Cummington street, which is now being equipped as a sales room, stock room, shipping room and service station. The purpose is to give a tire service day or night. In the service department is to be a 400-ton tire press, with which the largest tires made can be removed from and installed on wheels, and tires will be applied for any customer, no matter from whom purchased.

The machine equipment will be unusually complete and when operating the service department will make a specialty of changing truck tires from solid to pneumatic and will stock tires especially designed for changing truck equipment from pneumatic to solid tires. The work will be with a guarantee of satisfaction. The members of the concern will personally confer with truck owners or dealers with reference to the details of the sales proposition, which is new and decidedly attractive.



Big Pile of Tires and Shoes in Providence Which Were Purchased with War Savings Stamps and Thrift Stamps. There were 24,425 Pounds of Shoes and 766 Pounds of Tubes Turned in by Motorists, the Former Selling at Auction for 7.1 Cents a Pound and the Tubes for 19.1 Cents a Pound. The Machine Shown Sold for \$466, Making a Total Net Sales of Stamps of \$1946.50.

Pullman car or railroad coach with no top. This condition has brought into the limelight the necessity of a signaling device operated from the steering wheel and plainly seen by the driver behind both during the day and night.

Mr. Barkoot has written to Mr. Willys stating facts regarding signal lights and comparing the proposed hand signaling with an automatic signal. He told the great Toledo manufacturer that there was a strong possibility of misinterpretation of the intention of the driver behind in reading the signals and a chance of the signaler giving the wrong sign. The fact that St. Louis has passed an ordinance requiring a mechanical signal device on moving vehicles was also called to the attention of Mr. Willys. In the opinion of Mr. Barkoot it is only a question of time until motor car manufacturers will be compelled by public opinion to include as standard equipment some mechanical device for the prevention of accidents and to increase the safety of traffic. Flint, Mich., indorsed the Roedding signal tail light, which is a small cylinder enclosing a revolving

rison Radiator Corporation.

He had been a member of the Machine Company, 550th Infantry, M. S. T., for the past year.

1918 EDITION OF MAINE AUTOMOBILE ROAD BOOK.

Every motorist, fisherman, hunter or any one in fact who has ever visited the State of Maine and enjoyed its wonderful scenery, lakes, forests or sea coast resorts, will find the Maine Automobile Road Book intensely interesting, and those who anticipate a trip into that state, whether on a tour, fishing or hunting expedition or vacation, will find it an indispensable guide and source of information.

The 1918 edition which has just been issued by the Maine Automobile Association, is larger and more complete than any of the five preceding editions, and in addition to the large supplement map of automobile routes in the state and the map of the "Pine Tree Tour," includes 30 sectional maps in color, showing the main automobile routes, other highways,

F. E. HOLCOMB PRESIDENT WILLIAMS FOUNDRY & MCH. CO.

At the annual meeting of the Williams Foundry and Machine Co. the following officers were elected: President and general manager, F. E. Holcomb; vice president, S. F. Zilliox; secretary and treasurer, William Leary. These officers represent the new interests who purchased control of the company last fall. Since that time the company has been reorganized and its manufacturing facilities greatly increased to meet the demands of a larger volume of business.

Included in the new additions to the plant is a large three-story brick building, each floor 40x275 feet, devoted exclusively to the manufacture of Akron-Williams tire repair equipment.

MARLIN-ROCKWELL BUYS PLANT OF BRAEBURN STEEL CO.

To insure a continuity of supply of the high grade alloy steels used in their various products, the Marlin-Rockwell Corporation has recently acquired the plant of the Braeburn Steel Co. of Braeburn, Pa.

Plans have been made for extensive development of this property by the additional equipment of a six-ton electric furnace, thus making available two furnaces of this capacity.

The increasing needs of the Standard Roller Bearing Co. of Philadelphia and the enormous requirements of the Marlin arms factory at New Haven, Conn. (both of which are now owned by the Marlin-Rockwell Corporation), have resulted in bringing this source of steel supply within its organization. With their other sources of supply this provides additional assurance of an adequate quantity of these high grade materials.

The Braeburn company has long been known as specializing on high speed tool steels and electric steels, which will continue to be manufactured under the new ownership.

NEW MANAGER FOR BEARINGS SERVICE IN NEW YORK.

Announcement of the promotion of Mr. B. H. Boensch to the managership of the New York branch of the Bearings Service Co. has been made by Mr. A. K. Heber, general manager of the company.

Mr. Boensch for some time has been a special representative of the concern and has been engaged in appointing distributors. Through his intimate knowledge of the company's business he is well fitted for the duties which he has assumed. The New York branch is one of the most important of the chain of 22 operated by the Bearings Service Co. in its service function to the motorists on Hyatt, Timken and New Departure bearings.

The appointment of Mr. Boensch is in keeping with the policy of the Bearings Service Co. to always fill vacancies in its executive staff from its own organization whenever possible.

NEW ZEALAND DEALER INTERESTED IN AUTO ACCESSORIES.

J. B. Clarkson of Hope Gibbons Sons & J. B. Clarkson, Ltd., wholesale merchants of Wellington, New Zealand, has just returned from England and would like to hear from manufacturers or distributors of automobile accessories who are interested in developing their foreign trade. He is staying in New York at present, where his address is "R. W. Cameron & Co., 23 South William street." In several weeks he expects to leave for the Pacific coast en route for New Zealand.

UNITED ENGINE AND MFG. CO. ISSUES NEW PRICE LIST.

The United Engine and Manufacturing Co., Hanover, Pa., makers of garage and machine shop equipment, has sent to the trade a new schedule of list and dealers net prices which went into effect July 1.

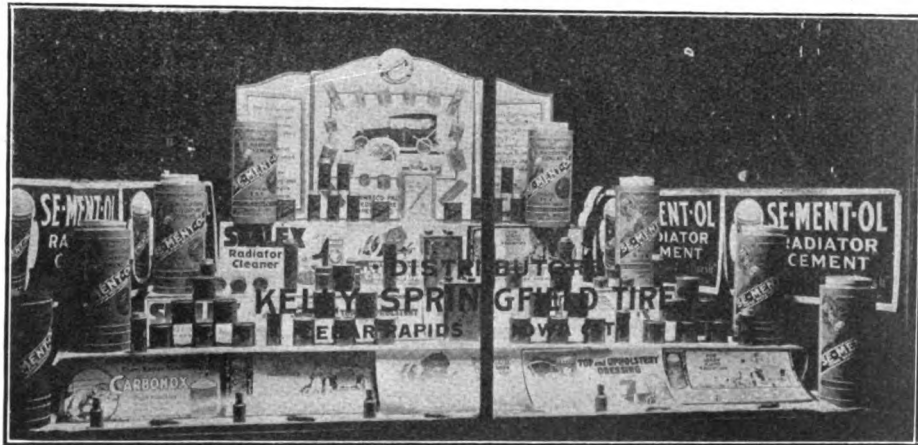
SAN FRANCISCO DEALERS ELECT.

Chester N. Weaver, one of the best known automobile men on the Pacific

friction. These little pin points also break off. This is termed "wear." Tiny particles of metal get into the lubricant and returning through the bearing parts act as an abrasive.

The proper lubricating graphite entirely overcomes this. It first fills the pores of the metal, after which it places a veneer over the entire wearing surfaces. After the graphite veneer has been secured friction will have been reduced to the absolute minimum known to mechanics—not only this, but wear of metals will be prevented for the reason that contact now between graphite and graphite and not metal and metal. It is obvious that if metals do not rub together they cannot wear.

To demonstrate, take two small pieces of hard faced paper: Lay one upon the other and try to move the top piece over the bottom one, applying weight and force. It is friction that holds the two pieces of paper together. Now take some fine flake graphite and rub a little on each piece of paper, place the graphited surfaces together and do the same as before. You now find that the papers move readily one upon the other. To



"Norwesco" Products Made by the Northwestern Chemical Co., Marietta, O., Attractively Displayed in the Show Window of the Western Auto Specialty Co., Cedar Rapids, Ia.

coast and head of the Chester N. Weaver Co., was elected president of the Automobile Dealers' Association of San Francisco at the annual meeting of the organization, which was held early this month.

TEST TO PROVE THE THEORY OF GRAPHITE LUBRICATION.

The theory of all lubrication is to keep two moving surfaces apart. In theory this is correct, and also correct in practise with this one exception: Any oil or grease will stand weight or stress up to a certain limit, but if unusual weight or stress is placed upon the machine the oil or grease will squeeze out from between the surfaces and allow the metals to touch.

Metals are never smooth. Under a microscope the most highly polished piece of metal resembles a nutmeg grater. There are little pin points sticking up, pores in the metal, tool marks and other irregularities. When the oil or grease squeezes out these irregularities interlock. This is the cause of

show this further, take one piece of paper on the corner of which is no graphite and rub upon the other graphited piece, rubbing for quite a time and in all directions, so as to work the graphite thoroughly into the paper. Now look at the paper and you will observe that the graphite has filled in the pores of the paper, after which it has placed a veneer over the entire surface. Rub your thumb over the graphited part and you will find that it does not rub off. Lay the two pieces of paper together and rub as before, placing weight upon it, and you find that the more weight applied, in other words, the more work flake graphite is given to do, the easier it moves, and unlike oil or grease, does not and cannot be squeezed out from the point of contact. In fact, it gathers at the point of contact until it has filled up the pores and irregularities in the paper.

This test illustrates the truth that irrespective of weight a film of graphite cannot be squeezed out. In fact the more weight applied the firmer it is embedded in the metal and the smoother the surface becomes.

Exposition of Trucks, Tractors and Accessories

Great War Time Farm Efficiency Demonstration Will
Be Held In Chicago During Week of September 14-21

The national exposition of trucks, tractors and accessories at the Municipal Pier, Chicago, is going to be a great war time, farm efficiency demonstration. The exposition will last a week, Sept. 14 to 21.

The first and second days, Saturday and Sunday, will be "curiosity seekers' days." Monday and Tuesday the hardware men of the country will attend the convention, because hardware dealers everywhere are getting in line to handle automobile accessories, and parts for trucks and tractors—and some of them are already agents for this machinery—along with their regular lines of hardware.

Wednesday will be Illinois day, when farmers from the state will have the right of way to all parts of the magnificent pier—that is to all parts except the quarters of the United States navy training school for ensigns.

And Thursday and Friday the threshermen of Illinois, Wisconsin, Iowa, Indiana and Ohio will hold a convention in the auditorium, nearly a mile from shore, as guests of the exposition committee.

There are more exhibitors already signed up for this great exposition than the total number at the 1917 show, which was held in the Coliseum, and there are still more than a month left before the show opens. Manager Buelow believes that before that time there will be twice as many exhibitors. It is also interesting to know that the space already contracted for is so much greater than the total floor space of the famous Coliseum that the Coliseum would seem small if set down in the area reserved for the Automotive and Accessories Exposition, Inc., which is the official name of this national exhibition.

An enthusiastic meeting was held a few days ago at the pier in preparation for the opening of the exposition, and many men prominent in various phases of farm improvement delivered inspiring talks. One of the most interesting statements was that of C. C. Parlin of Philadelphia, formerly principal of the Waupaca, Wis., high school, who said that contrary to general opinion there were more horses in the United States in 1917 than ever before, the United States government estimating the total number at 25,000,000.

William G. Edens, president of the Illinois Highway Improvement Association, explained the plans to "lift Illinois out of the mud," by voting for a \$60,000,000 bond issue at the next fall election. Not one cent of this money is to be spent until after the war.

Hugh McVey of Topeka, Kan., predicted that the truck, tractor and accessory exposition would prove as great a factor in helping to win the war as did the harvester, which appeared in Chi-

cago and went from Chicago to the adjoining states at a time when the Civil War made it vitally important to raise and harvest more wheat with fewer men in the grain fields. Illustrating the importance of improved farm machinery, Mr. McVey pointed out that in Nebraska the value of the farm products has increased in the last 20 years from \$100,000,000 to \$900,000,000—nine times as much on very nearly the same acreage.

E. E. Parkinson of Madison, Wis., told how the threshermen, loyal to the core, are putting their outfits in the best possible condition for the threshing season. They have lost many trained men, but their determination is splendid, said he. This exposition is an opportunity to render a big service to the people of America by showing what modern methods can do to save man power.

The Municipal Pier, where the exposition is to be held, is just off the "loop" and street cars run clear to the end. It is also reached by harbor excursion boats, which connect it with Lincoln Park to the north and Jackson Park to the south.

That the exposition will prove the greatest war time exhibition in the history of the world is indicated by the flood of applications for space.

Up to July 10 there had been almost 100 different applications for space and many of the best known manufacturers have taken not one, but three or four exhibition spaces on the pier for this great show. Since July 10 the daily list of new exhibitors has broken all records according to H. W. Buelow, general manager of the exhibition, and this September demonstration of what American ingenuity has done to increase farm power, improve transportation and to make old automobiles take the place of new, will prove a revelation.

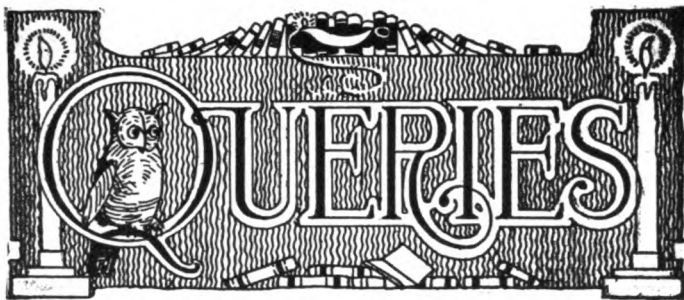
The first exhibitors to take space in the order of their arrival are:

Arrow Grip Manufacturing Co., Glenn Falls, N. Y.; Clark Publishing Co., Madison, Wis.; Carborundum Co., Niagara Falls, N. Y.; Fordowner, Milwaukee, Wis.; Motor Vehicle Publishing Co., New York, N. Y.; Essenkay Products Co., Chicago, Ill.; A. W. Shaw Co., Chicago, Ill.; System on the Farm, Chicago, Ill.; Twin City Varnish Co., St. Paul, Minn.; H. G. Paro Co., Chicago, Ill.; E. Kern Bros. Mfg. Co., Flandreau, S. D.; Automotive Accessories Co., Baltimore, Md.; Perfex Radiator Co., Racine, Wis.; New Lite Lens Co., Chicago, Ill.; U. S. Auto Supply Co., Chicago, Ill.; Brown & Caine, Inc., Chicago, Ill.; Metal Specialties Mfg. Co., Chicago, Ill.; Geo. D. Bailey Co., Chicago, Ill.; Jefferson Electric Mfg. Co., Chicago, Ill.; Atlas Specialty Mfg. Co., Chicago, Ill.; The Reliance Co., Chicago, Ill.; Harry Newman, Chicago, Ill.; Advance Accessories Corp., Chicago, Ill.; Bailey Non Stall Differential Corp., Chicago, Ill.; The Zinke Co., Chicago, Ill.; Milwaukee Auto Engine and Supply Co., Milwaukee, Wis.; Shurnuff Mfg. Co., St.

Louis, Mo.; Romort Mfg. Co., Oakfield, Wis.; Champ Spring Co., St. Louis, Mo.; Standard Underground Cable Co., Pittsburgh, Pa.; Metal Ware Corp., Chicago, Ill.; Burgess Mfg. Co., St. Joseph, Mich.; Blake Mfg. Co., South Bend, Ind.; Chal-loner Co., Oshkosh, Wis.; Cooper Auto Specialty Co., Thomasville, Ga.; Motor Car Equipment Co., New York, N. Y.; The Duplex Engine Governor Co., Brooklyn, N. Y.; Van Cleef Bros., Chicago, Ill.; Edelman & Co., Chicago, Ill.; Cummings Foster Corp., Chicago, Ill.; Perry Auto Lock, Chicago, Ill.; Defender Auto Lock, Detroit, Mich.; McIntyre Mfg. Co., Chicago, Ill.; The Dayton Wire Wheel Co., Dayton, O.; W. D. Sullivan, Chicago, Ill.; Dole Valve Co., Chicago, Ill.; Empire Auto Specialty Co., Chicago, Ill.; Koupet Auto Top Co., Belleville, Ill.; Heinzelman Bros. Co., Belleville, Ill.; Presto Cloth Mfg. Co., Toledo, O.; Wood Hydraulic Hoist Body Co., Chicago, Ill.; A. A. Lawder Sons Co., Chicago, Ill.; The Wyman Sales Co., Chicago, Ill.; Balso Oil Co., Toledo, O.; Balso Oil Co., Council Bluffs, Ia.; Agrimotor, Chicago, Ill.; Falls Motor Corp., Sheboygan Falls, Wis.; Buller Coupler Sales Co., Madison, Wis.; Orange Judd Co., Chicago, Ill.; White Star Refining Co., Detroit, Mich.; American Manganese Steel Co., Chicago, Ill.; La Crosse Tractor Co., La Crosse, Wis.; Hooven Radiator Co., Chicago, Ill.; Electric Steel Truss Wheel Co., Kankakee, Ill.; Guaranteed Tractor Corp., Chicago, Ill.; One Wheel Truck Co., St. Louis, Mo.; Traffic Motor Truck Corp., St. Louis, Mo.; Winthrop Motor Truck Co., Winthrop Harbor, Ill.; Huford Co., Chicago, Ill.; Mechanical Belt Co., St. Joseph, Mo.; K & D Lamp Co., Cincinnati, O.; New Era Specialty Co., Grand Rapids, Mich.; Eclipse Valve Grinder Co., Kansas City, Mo.; Link Belt Co., Chicago, Ill.; Harding & Co., Chicago, Ill.; Anderson Electric Specialty Co., Chicago, Ill.; Atlas Auto Supply Co., Chicago, Ill.; N. A. Petry Co., Philadelphia, Pa.; Reflex Ignition Co., Cleveland, O.; Gray-Heath Co., Chicago, Ill.; Nilson Tractor Co., Minneapolis, Minn.; Hoosier Auto Parts Co., Muncie, Ind.; A B & B Specialty Co., Milwaukee, Wis.; Milwaukee Forge and Machinery Co., Milwaukee, Wis.; Higgins Spring and Axle Co., Racine, Wis.; S K F Ball Bearing Co., Hartford, Conn.; Forschner Motor Truck Mfg. Co., New Orleans, La.; Sumter Division, Splittorf Electric Co., Chicago, Ill.; Commercial Truckmobile Co., Chicago, Ill.

The products of the following companies will be exhibited by the Gray-Heath Co.

L. P. Halladay Co., Streator, Ill.; New York Coil Co., New York, N. Y.; A. C. Savidge Co., Indianapolis, Ind.; Cuno Engineering Corp., Meriden, Conn.; Cole Gasoline Gauge Co., Chicago, Ill.; Wright Roller Bearing Co., Philadelphia, Pa.; Newton Horn Co., Brooklyn, N. Y.; "X" Laboratories, Boston, Mass.; Hudson Motor Specialty Co., Philadelphia, Pa.; Jas. P. Neerup Co., Chicago, Ill.; F. W. Oettinger Co., New York, N. Y.; Lockfast Tire Carrier Co., Cleveland, O.; Standard Speedometer Co., Boston, Mass.; General Appliance Co., Boston, Mass.; Hansen Manufacturing Co., Cleveland, O.; Gibraltar Jack Co., New York, N. Y.; Bell Manufacturing Co., Detroit, Mich.; Continental Piston Ring Co., Memphis, Tenn.; A. E. White Machine Works, Eau Claire, Wis.; Harris & Reed Co., Chicago, Ill.; Barcolo Manufacturing Co., Buffalo, N. Y.; Friden Manufacturing Co., San Diego, Cal.



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

WHAT GASKETING METHODS HAVE YOU FOUND BEST TO KEEP YOUR ENGINE TIGHT AND INSURE IT AGAINST OIL LEAKAGE?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the issue in which the question appears. Answers to the question should be in the hands of the editors by the 15th of Augut. The contest is open to every one.

WHAT ARE THE BEST METHODS USED IN REPAINTING AND REFINISHING A CAR?

(J. B. S., Scranton, Pa.)

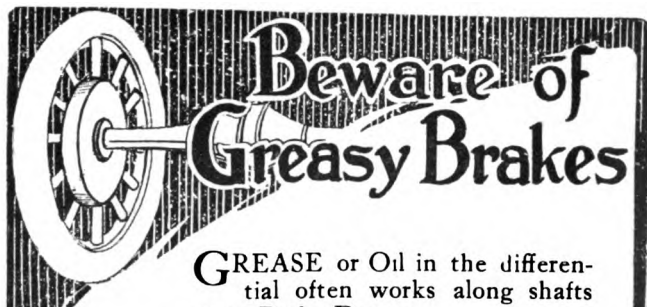
Best Letter.

All of the loose paint and varnish should be scraped off with a sharp putty knife. If the car is to be painted a dark color, or the same color as before, the old paint, which is firmly on the parts, may be left, since it forms a good foundation upon which to work. A smooth foundation is necessary and all the parts should be gone over with steel wool, then fine emery cloth or sandpaper. Any gloss left on the metal or wood parts should be removed by the same means. Two thin coats of flat color should first be applied, allowing each coat to dry thoroughly before the next is put on. All the painted parts should then be gone over again with fine finishing sandpaper and two more coats applied. Consecutive coats of flat color should be applied and smoothed down until the whole surface is fully covered and absolutely smooth.

The following is a practical method for putting on fine lines or striping: Prepare a pasteboard guide (for curves) or a long, smooth edge for straight lines, and use a draughtsman's lining or ruling pen. Do not try to make the lines too broad with this instrument or the color will not apply smoothly and will be apt to blot. Lines 1/16 of an inch in width can be applied by this method. Use lining brush, dipping into the color and absorbing just enough to fill the bristles, but not to drip.

After the paint has been given at least 12 hours to dry the varnish may be applied. Three coats of outside spar varnish are first applied and then the parts should be smoothed down with a paste of pumice and oil. For smoothing up the new varnish: Cut a piece of soft pine board half an inch thick by 1½ inches wide, by three inches long, and cover it on one

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Pat. March 2, '15; Feb. 29, '16

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side with a heavy pad of soft cotton cloth. Over this stretch another heavy strip of cloth and tack it to the sides of the wood block. Soak the pad with crude oil and rub about a half teaspoonful of fine powdered pumice into the top; then carefully rub the varnish, smoothing off all the rough spots and adding oil and pumice from time to time until all the varnish has been gone over. Use the greatest care not to remove the varnish at any point or the unprotected paint will be scraped off.

Successive coats of varnish should be added, each coat allowed to dry fully and then smoothed down with pumice. The number of coats will be determined by the condition of the body. The final coat should be applied with a soft brush. Varnish being thick, it should be applied with long, quick strokes of the brush. Varnish dries very quickly and unless the greatest speed in applying is used the final coat will show brush marks.

In preparing the chassis for painting all of the grease should first be removed and the parts, such as springs, radiator, mudguards and fenders, as well as the body, taken from the chassis. A strong solution of potash lye will remove both grease and loose paint, although the lye should be thoroughly washed from the metal parts before applying the paint. Before painting the frame all of the bolts which fasten the different units and control rod guides in place should be tightened so as to prevent rattles and squeaks. The springs should be disassembled and the contacting surfaces cleaned free from rust and polished, then given a good coating of graphite and oil. Do not apply the paint too liberally to the springs or it will work between the leaves and cause friction.

Not so much care need be taken in finishing the frame as was used on the body. Three coats of flat paint and three of varnish should be sufficient. Unsightly holes in the cast iron parts, blisters or cracks in the metal may be filled with an iron cement obtainable from any supply store.

A thick coat of paint should not be applied to the radiator. It should be given a thorough cleaning and scraped with a wire or stiff bristle brush. All grease should be removed with potash lye and a thin coating of flat color applied. Any bubbles, paint or blisters should be smoothed off and a second coat applied when the first has dried. A spraying device, such as is used for applying cedar spray, may be used for this work. Instead of using the mouth for air supply an air pump may be attached to the mouthpiece. After the flat color has had plenty of time to fully set, one or two coats of enamel may be applied in the same manner. In painting the radiator only enough color and enamel should be added to secure a good finish, for thick coatings of paint have a tendency to reduce the radiating area.

(R. L. Prindle, No. Abington, Mass.)
Second Best Letter.

With patience and care the average person may safely undertake the task of repainting an automobile. The paint on the car is composed of three principal parts. The first is the priming or foundation, second is the color and third is the protective coating, which may be called the overcoat of the color coats, as when this is worn off the under coats soon go. The object of the priming coat is to provide a smooth base for the color applications for the coats that are to follow. The color itself is composed of a number of thin coats of flat color rubbed smooth and gives the foundation of the job. If the protective coat is preserved the color coats will maintain their original luster.

The amateur who undertakes the task of repainting the car will not have to start fresh, because a large part of the work is already done for him. It is only when the color is practically gone that the priming coat is necessary. Assuming this is the case, the entire surface of the old paint should be gone over with steel wool, then fine sandpaper. Before any work is begun all grease or grime should be removed by a thorough washing with soap and water. This also applies to the running gear. A good lather is worked up in the usual way with sponge and care should be taken to rinse all trace of the soap with cool water.

Grease about the axles and other chassis parts is best removed with a brush dipped in gasoline, after which wiped



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dry and washed the same way as the body. All breaks in the surface of the former paint are then filled with putty, allowing this to dry for a full day before touching again.

All the retouched spots and, in fact, the entire body should be gone over carefully again to see if the surface is perfectly level. Fine sandpaper can be used for this and in order to be absolutely safe no fine paint dust remains the body should again be washed in cool water.

Very often dents are found in the mudguards and fenders, and to do justice to the refinishing job these will have to be removed, because their presence would be more noticeable when the luster was restored. An effective means to accomplish this end is as follows: Hinge to the side of the garage about 12 inches above the work bench a length of heavy joist fitted with a wooden rod. With the joist acting as a lever and the rod pressing against a dented mudguard or fender, ordinary bends or dents may be removed with no great pressure, leaving them as good as before the accident. For bends of different shape the end of the rod is changed. Where the bend is short and deep a round point rod is best to use. A bag of sand can be used to form a backing beneath the rod.

The room in which the painting is to be done should be dust proof and neither too light nor too dark—tending toward a little dark is best. The color coats are flat and mixed very thin. The thinner the better, because in a way a greater number may be applied and a better job results, and naturally will take more time to do it. After each coat is put on sufficient time is allowed to dry it thoroughly. Then it is gone over carefully and thoroughly with pumice, rubbing down all rough spots that can be found. The pumice comes in powdered form, obtainable at any hardware store.

The color coats number anywhere from three to 30, depending how well one desires the job to be done, though three should be enough for ordinary cases. Care is taken to give the last color coat plenty of time to become dry. A coat of color varnish is now spread over these and when dry rubbed down to absolute smoothness and any striping desired is put on at this time. This will, no doubt, cause some trouble for

the amateur painter. With a little practise on the garage wall and if one has a steady hand, can be accomplished satisfactorily, and if a chalk line is made lightly, then follow this. A pasteboard form may be prepared for the curves. Lining brushes are made specially for this purpose and when used just enough color is taken up so as not to drip, and when once started do not stop until the end of the stripe is reached. When dry two coats of rubbing varnish rubbed down to absolute smoothness with a paste composed of pumice and water. The final coats are two of pure spar varnish smoothly applied with a wide paint brush of good quality that does not shed bristles. As in every case be careful that one coat is hard before the other is put on. Each of these coats are rubbed down with pumice and crude oil for a high luster and the body is now finished.

Mix up some flat color not quite so thin as that used on the body and go over such parts as lamps, radiator, hood and fenders, etc. When dry give them a good coat of enamel, which is obtainable at any automobile supply house and brush it out well. The hood is subject to much heat and for this reason something out of the ordinary must be used, also the extra hard service the parts are called upon to give, enamel best solves the problem. There are, however, concerns who are equipped to enamel these parts by baking it on by the use of ovens and a superior luster is had. When removed these could be sent to such a concern if one so desires.

Preparing the chassis is simply a matter of getting rid of all grease. Unless this is done thoroughly the paint would only adhere to the clean place and a poor job would result. First remove the grease, then wash with soap and warm water, or if washing powder is used this should be dissolved first in the water. When this is done proceed the same as with the body, only the flat color is not mixed so thin. The color varnish, which is applied to the surface before the finishing coat, is simply a mixture of the particular color used and varnish. The mixture generally used is about one-quarter pound color to two pounds of the varnish.

If a more thorough job is necessary owing to the bad con-

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(When Writing to Advertisers, Please Mention The Automobile Journal.)

dition of the paint, it will be best to scrape off the old paint. Or if the color desired is different from that already on this will also have to be removed. The first method for the amateur to use is to secure some good paint remover and follow the directions furnished with it. If one attempts to burn it off with a gasoline torch chances are that the entire body may be destroyed unless one is an expert in its use. No one should undertake the risk. Scraping will be necessary in addition to the chemical removing agent. When the paint is scraped off bring everything to a high finish with fine sandpaper all over. Then apply a coat of metal primer purchased at any paint shop ready for use, and apply evenly over the whole surface with a broad scraping knife. This is allowed to dry for at least two days before it is sandpapered down to a smooth surface.

A coat of rough stuff filler is applied over the primer by mixing two pounds keg oil ground lead with a 50 per cent. mixture of coach japan and rubbing varnish. These are mixed to a stiff paste and applied evenly. The number of coats to put on is four, with at least a day between each. After allowing this to dry a week rub it down to a smooth surface with a pumice cake and water. Pumice and water produces a dull finish, while pumice and oil gives a high luster and the latter is used only on the final coats of varnish.

Before applying the first coat slightly roughen the body with No. 0 sandpaper; apply a good ground color, depending on the color one is using, then proceed as previously directed, taking care that the room is fairly dark and no dust allowed on the job.

The articles needed are three brushes, size one, two and three inches wide of good quality; one-half dozen at least of sandpaper No. 0 and coarse; a lining brush and some pumice.

IGNITION TROUBLE IN OAKLAND SIX.

(C. P. T., Buffalo, N. Y.)

I have an Oakland Six, model 32 B 1916, with Delco system, and do not think that the timer is properly set. Will you kindly answer by mail, giving correct position of piston at instant of spark, with car running 15 to 30 miles per hour. This and any other information on above will be thankfully received. I am a subscriber of the Automobile Journal.

Set the spark lever on the steering wheel in the closed or "retarded" position, then remove the cover of the distributor which carries the spark plug cables. Taking this off will expose the breaker mechanism to view. The cam on the vertical shaft should now be just leaving the breaker point. If not, loosen the screw in breaker shaft and turn the cam, then tighten the screw. Replace the distributor cap and take note that the contact of rotor is just beginning to make contact with No. 1 terminal. This is the firing position of cylinder No. 1 and all the other cylinders should fire in order if the cables have not been misplaced. Should this have occurred remove them and attach them to fire the cylinders, beginning with the one next to the radiator in the following order: 1, 5, 3, 6, 2, 4.

DIFFERENTIAL OF CHEVROLET.

(H. A. B., Schenectady, N. Y.)

I am having trouble with the differential on my Chevrolet car. I took it down last month and found washers of which there are three on each side of differential gear. These were worn quite badly, so I put in five new ones and I think that they are inserted properly, but they seem to heat up. Was told that the wheels were too tight, but have used plenty of good oil and the car has been run 4000 miles. Have tried to keep everything in the best possible condition. If you can help me on the above question I will be very thankful. I get many good pointers out of the Automobile Journal.

The rear axle should be placed upon two horses or boxes for disassembling. With the axle in this position the hub caps and wheels are first removed. The nut on the rear end of the rear axle truss rod can then be removed from the housing.

The bolts at the center of the axle housing are next taken out and the two sections of the housing slipped from the differential and shaft assembly. The differential is held together by three studs and nuts, the nuts held from turning by a length of wire through the three studs. The wire should

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Yet most roller bearings have a brake which prevents the rolls from turning freely, naturally causing friction. This useless part is called a "cage" and is used to hold the rolls in position. Beside the braking action on the rolls it takes up room in the bearing.

The Wright Taper Roller Bearing is the only taper roller bearing which does not have this unnecessary and troublesome part. Its design is fundamentally correct, making this cage unnecessary, and in the space gained by its removal are used more rolls, increasing its capacity nearly 50 per cent. over other roller bearings of the same size and adding thousands of miles to its wear-resisting capacity.

The rolls support the load and reduce the wear. The more rolls, the less wear on each and the less weight each has to carry.

Look at the cuts and the diagram, then ask your dealer to show you the only "cageless" taper roller bearing made for Fords.

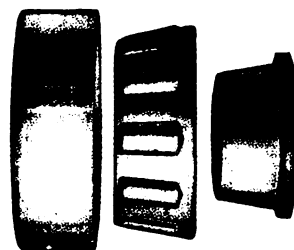
Dealers: Ask your Jobber or write us.

NATIONAL BEARINGS SERVICE CO. WRIGHT TAPER ROLLER BEARINGS

Replacements for all Standard types of Bearings

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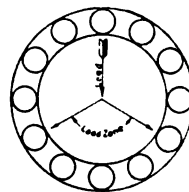
18 West 62nd St., New York.



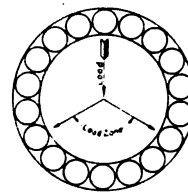
Average Type.
Note the cage (center of cut) and count the rolls.



Wright Type.
Note absence of "cage." Count the rolls.



VARIOUS TYPES
(AVERAGE NUMBER OF ROLLS, 12)



WRIGHT TYPE EXCLUSIVELY
(AVERAGE NUMBER OF ROLLS, 15)

Price, \$10.00 per set
(4 Bearings)

In Canada, \$15.00

Fits Chevrolet 490 Also

be cut, the nuts removed and the smaller part of the differential case removed, exposing the differential gears, the pinions and permitting their removal.

The differential gears are held to the shaft by a split ring, which is removed by driving the gears back upon the shaft about one-quarter of an inch. After the ring has been removed the gears can be drawn from the shafts.

Any play or lost motion between the differential gears and differential pinions should be compensated for by inserting the proper thickness of fiber washer between the differential case and differential gears, being careful to keep the washer on either side the same thickness as the one on the other.

The roller bearings on the inside of the housing at the center of the rear axle slip out of the outer races, or so-called differential bearing lining with the axle, and these can be removed after the differential has been disassembled. The replacement of the old outer race once it has been removed is very difficult, for removal is quite certain to distort it. If for any reason the race is removed it should be replaced by a new one. The outer race of the roller bearings at the outer end of the housing being held in by a set screw may be removed, often without damage, if care is exercised.

All parts should be adjusted according to wear and the whole assembly carefully washed in kerosene before replacing. A good lubricant should be obtained, as the best is none too good and the axle properly filled and replaced beneath the car, tightening all nuts and bolts carefully.

LIGHTING TROUBLE.

(D. C. T., Frankford, Pa.)

As a subscriber to the Automobile Journal I am requesting information in regard to my car's headlights.

Recently I have had trouble with my lights and I cannot locate it. I have a 1917 model 75 Overland and when the engine is racing the lights will burn brightly, but when I throw the shift lever into high gear and drive steadily the lights go down as though dimmed, while the tail light will burn whether

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the switch is on or off unless I disconnect it at the lamp socket.

No doubt your trouble probably comes from defective wiring and a short circuit has resulted.

By a short circuit we mean that two wires of opposite polarity are in metallic contact. Under such conditions the battery will be partly or completely discharged and no lights or dim lights will result. A short circuit may occur at any point in the wiring system, but is most usually found at a connection or switch terminal and is caused by the frayed ends of the wires bridging across the terminals. A short circuit may be caused by a double ground, that is, each wire of opposite polarity may be in contact with the frame of the car. The ammeter will always show whether or not a short circuit exists in any part of the wiring except from the battery to the switch bus bar, and in the starting motor circuit.

Go over carefully each inch of the conductor wires connected at one end to the battery terminals and at the other end to the bus bars of the lighting switch. Be sure that the insulation is perfect and that no sharp metal corners have cut it through. In the same manner note the wiring from the battery to the starting motor and starting switch. If the battery has been discharged have it recharged.

Trace out the circuits, watching for grounds or short circuits. If no trouble is found in the wiring it will be located in the lamp sockets, the connectors or the bulbs. Trace out the defective circuit until the trouble is located.

Should you not be able to trace or locate the trouble it will be necessary to write the manufacturers at Toledo, O., for further advice and you should include the following information in your letter.

Give the reading of the ammeter when the lights are all burning and the car is being driven over the road at 15 miles per hour; when the lights are all burning and the engine is not running; when the engine is operating car at 15 miles per hour and lights are not burning; when the engine is not running and lights are not burning. And also give serial number of generator.



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REST



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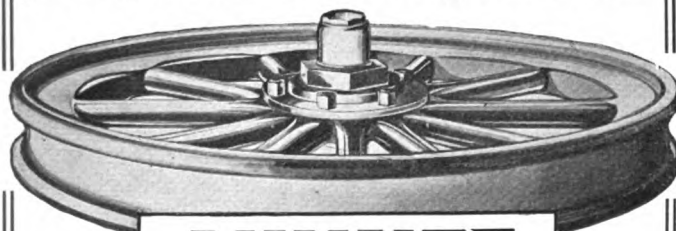
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ABOUT PUMP LEAKAGE.

(F. L. A., New York City.)

Kindly recommend through the query columns of the Automobile Journal some substance that can be applied to a leather washer of a tire pump so as to not allow the air to filter through and thus cause excess exertion and loss of temper and air.

It is very doubtful that the air filters through the leather washer of your pump. It is more likely that the washer is a poor fit. However, if the washer does fit snugly and at the same time still leaks, it is possible that a little neatsfoot oil or castor oil applied to the washer will remedy the trouble. If this does not stop the trouble would advise installing a new washer.

SHOES VS. TUBES.

(C. R., Newport, R. I.)

Will you kindly favor me with your opinion as to which of the two combination of tube and shoe is to be preferred as a safeguard against blowouts. Good tubes in fair shoes or fair tubes in good shoes.

There is no absolute safeguard against blowouts, but one can guard against them by having the tires properly inflated to their full pressure at all times and by having any cut or weak place in the tread immediately fixed. Regarding your opinion it seems the best policy to have good shoes, as in this case the tubes would be less likely to give trouble. The tire has to stand most of the wear and tear to take the strain of the car and also to protect the tube. The fact that a poor tire containing a good tube would not prevent a blowout is evident. The best policy when possible is to have the best of shoes and tubes, as it is cheaper in the end.

QUIETING OVERHEAD VALVES.

(C. G. C., Dallas, Texas.)

The valves on my car are the overhead type and they have become very noisy during the past month. Can you tell me the trouble and how I may fix them myself without going to much expense?

On the majority of overhead type valve engines small fiber rolls are generally fitted on the valve arm at the point where it touches the valve stem. This method is used for the purpose of obtaining noiseless operation. As a general rule these rolls are allowed to rotate as they please. At times they rotate with certain regularity, while at other times they remain stationary, which, of course, results in uneven wear upon their surface. When they are allowed to run unevenly the result will be uneven timing and the engine will not operate smoothly. A simple way to overcome the noise that you mention is to remove the valve arm and slightly rivet the pin upon which the roll is mounted. It will require only a little riveting to make the roll stationary. The valve arm and the roll when adjusted will then be able to time the valve with some degree of accuracy. When the rolls become so worn that a gap larger than is required appears between the valve stem and the rolls, adjustment can be made by letting out on the push rod adjusting screw, or by turning the roll to a new position.

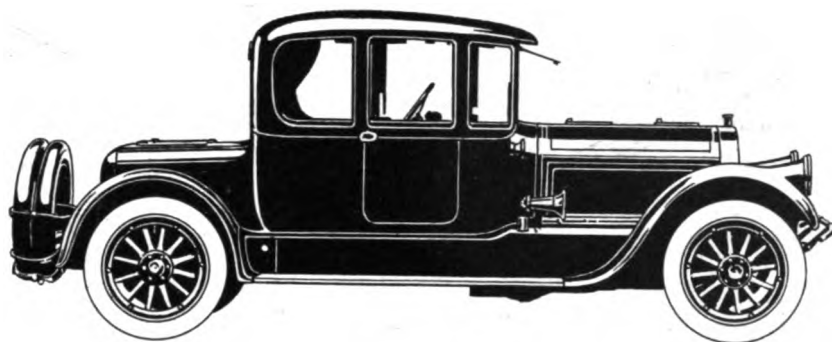
TIMING FORD VALVES.

(E. B., Marblehead, Mass.)

Will you please tell me how to set the timing gears on my Ford 1916 car? I have made a careful examination of the gears and though there is a mark on the crankshaft, there is no corresponding mark on the camshaft gear and I did not make one when I disassembled the engine.

The crankshaft is first turned clockwise, that is, towards the right, until the piston in No. 1 cylinder has traveled past top center 1/16 of an inch. Then turn the camshaft anti-clockwise or towards the left until the inlet valve in No. 1 cylinder starts to open, then mesh the gears. As a check against the timing the exhaust valve should open 5/16 of an inch before bottom center and close at top center.

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